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Local perceptions and attitudes towards biodiversity in the Lagoas de Cufada Natural Park (LCNP), Guinea-Bissau

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FCT
Fundação para a Ciência e a Tecnologia

Declaration

I declare that the work undertaken and reported within this thesis is my own and has not been submitted in consideration of any other degree or award.

Signed: …….. Date:……

I dedicate my thesis to all who work or dedicate their life in
finding a peaceful compromise between
Humans and Nature

Nature is a part of our humanity, and without some awareness and experience of that divine mystery man ceases to be man.When the Pleiades and the wind in the grass are no longer a part of the human spirit, a part of very flesh and bone, man becomes, as it were, a kind of cosmic outlaw, having neither the completeness and integrity of the animal nor the birthright of a true humanity.

Henry Beston, 1971: vi

Abstract

Although protected areas have several goals, these areas were created mainly to protect biodiversity. This thesis was designed to explore the links developed between local human communities, the forest and other animals, in particular non-human primates (NHP). With this thesis I intended to: a) understand relationships between resource use, protected areas and local people's attitudes; b) identify problems for biodiversity conservation; and, c) to suggest potential solutions. Thus, the study of the perceptions and attitudes of the Beafada community – the major ethnic group present in the LCNP (77,4%) – and the Balanta – the second one (8,7%) - was important to understand how these can interfere or dictate the way natural resources are managed by local communities as well as their NHP hunting and bushmeat practices. Data collection used four different methodological techniques consisting of: (a) survey questionnaires; (b) in-depth interviews; (c) focus-groups; and, (d) non-participant observation. The study period was divided in three distinctive stages during a total of 6 months. Since hunting and bushmeat trade represent major problems for wildlife conservation in LCNP, this thesis hopes to contribute to an improvement of the conservation measures regarding NHP's preservation.

Keywords: Lagoas de Cufada Natural Park; local ecological knowledge; wildlife perceptions; local attitudes; ethnicity; wildlife conservation; hunting practices; non-human primates; bushmeat trade; natural resources.

Resumo

Embora as áreas protegidas tenham vários objetivos, estas foram criadas sobretudo para a proteção da biodiversidade. Esta tese foi concebida no sentido de explorar as ligações desenvolvidas entre as comunidades humanas locais, a floresta e os outros animais, em particular os primatas não-humanos (PNH). Com este estudo pretendeu-se: a) compreender as relações entre a utilização dos recursos naturais, as áreas protegidas e as atitudes das comunidades locais; b) identificar problemas para a conservação da biodiversidade; e, c) sugerir potenciais soluções. Assim, o estudo das percepções e atitudes dos Beafada - maior grupo étnico no PNLC (77,4%) - e Balanta - o segundo (8,7%) – foi importante para se perceber a forma como os recursos naturais são gerenciados, assim como os hábitos de caça das comunidades locais. Neste estudo foram utilizadas quatro técnicas metodológicas: (a) inquéritos por questionário; (b) inquéritos por entrevista (em profundidade); (c) grupos focais; e, (d) observação não-participante. O período de recolha dos dados foi dividido em três fases distintas durante 6 meses. Uma vez que a caça e o comércio de animais selvagens representam sérios problemas para a conservação da vida selvagem no PNLC, esta tese pretende contribuir para a melhoria das medidas de conservação dos PNH existentes no Parque.

Palavras-chave: Parque Natural das Lagoas de Cufada; conhecimento ecológico local; percepções da vida selvagem; atitudes locais; etnicidade; conservação da vida selvagem; prácticas de caça; primatas não-humanos; comércio de carne selvagem; recursos naturais.

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Table of the Species named in this Thesis

Common name	Scientific name	Creole name
Primates		
Chimpanzee	*Pan troglodytes verus*	Dári
Western Black-and-white colobus	*Colobus polykomos*	Sancho fidalgo
Red colobus	*Procolobus badius temminckii*	Fatango
Campbell's monkey	*Cercopithecus campbelli*	Sancho mona
Baboon	*Papio papio*	Kón
Patas monkey	*Erythrocebus patas*	Sancho fula
Sooty mangabey	*Cercocebus atys*	Sancho preto ou kankolma
Green monkey	*Chlorocebus sabaeus*	Sancho de tarrafe
Bush baby	*Galago senegalensis*	Sancho
Lesser spot-nosed monkey	*Cercopithecus petaurista*	Sancho
Capuchin monkey (Amazonia)	*Cebus capuchinus*	Sancho
Ungulates		
Roan antelope	*Hippotragus equinus*	Boca-branca
Gazelle	*Gazella rufifrons*	Gazela
Red river hog	*Potamochoerus porcus*	Porco-do-mato vermelho
Warthog	*Phacochoerus africanus*	Porco-do-mato preto
Bush-pig	*Potamochoerus larvatus*	Porco-do-mato
Porcupine	*Hystrix cristata*	Porco-espinho
Bay Duiker (bush-goat)	*Cephalophus dorsalis*	Cabra-mato
Red-flanked Duiker	*Cephalophus rufilatus*	Cabra-mato vermelha
Yellow-backed Duiker	*Cephalophus silvicultor*	Ferintamba
African Buffalo	*Syncerus caffer*	Búfalo
Carnivorans		
Lion	*Panthera leo*	Leão
Leopard	*Panthera pardus*	Onça
Hyena	*Crocuta crocuta*	Lobo
Pangolins		
Pangolin	*Manis tetradactyla*	Tucurtacar
Mammals		
Elephant	*Loxodonta africana*	Elefante
Hippo	*Hippopotamus amphhibius*	Piscabalo
Reptiles		
Snake	*Pyton sebae*	Irancego

Turtle	*Kinixys belliana nogueyi*	Tartaruga
Crocodile	*Osteolaemus tetraspis*	Crocodilo
Birds		
Purple glossy starling	*Lamprotornis purpureus*	Cacho
Abyssinian ground-hornbill	*Bucorvus abyssinicus*	Cacho
Fish		
Mudskipper	*Periophthalmus argentilineatus*	Saltón
Insects		
Butterfly	*Brephidium* species	Borboleta
African honey bee	*Apis mellifera scutellata*	Baguera
Rodents		
Cane rats	*Thryonomys swinderianus*	Farfanas
Squirrel	*Xerus erythropus*	Saninho
Domestic animals		
Pig	*Sus scrofa scrofa*	Porco
Chicken	*Gallus gallus domesticus*	Galinha
Cow	*Bos primigenius*	Baca
Goat	*Capra aegagrus hircus*	Cabra
Trees		
Palm Tree	*Elaeis guineensis*	Palmeira
Africa fan palm	*Parinari excelsa sabine*	Cibe
Kapok tree	*Ceiba pentandra*	Poilão
Cashew	*Anacardium occidentale*	Caju

List of Acronyms

AD	Acção para o Desenvolvimento
AEWA	African-Eurasian Waterbird Agreement
CBD	Convention on Biological Diversity
CBMP	Coastal and Biodiversity Management Project
CITES	Convention on International Trade in Endangered Species
CMS	Convention on the Conservation of Migratory Species of Wildlife
COL	Convention on Climate Change and Oceans Law,
CPD	Convention to Prevent Desertification
DBT	Dulombi-Boé-Tchetche Complex
DENARP	Documento de Estratégia Nacional de Redução de Pobreza
EU	European Union
FBG	Foundation Bio-Guinea
FIAL	Fund for Local Environmental Initiatives
GEF	Global Environment Facility
GGB	General Government Budget
GNP	Gross National Product
IBAP	Institute for Biodiversity and Protected Areas (Guinea-Bissau)
ICN	Instituto de Conservação da Natureza
ICNB	Instituto de Conservação da Natureza e da Biodiversidade
ILAP	Inquérito Ligeiro para Avaliação da Pobreza
IMF	International Monetary Fund
IUCN	International Union for Conservation of Nature
LCNP	Lagoas de Cufada Natural Park
LEK	Local Ecological Knowledge
MDG	Millennium Development Goals
NGO	Non-Governmental Organization
NHP	Non-Human Primates
NP	Nature Protectionists
NPAI	National Programme of Agriculture Investment
NTFP	Non-Timber Forest Products
OCDE	Organização para a Cooperação e Desenvolvimento Económico
PAIGC	Partido Africano da Independência da Guiné e Cabo-Verde

SC	Social Conservationists
SPSS	Statistical Package for Social Sciences
UN	United Nations
UNDP	United Nations Development Programme
UNODC	United Nations Office on Drug and Crime
WB	World Bank
WRI	Weighted Rank Index
WWF	World Wildlife Fund

Chapter 1

Livelihoods, biodiversity conservation and people's attitudes to protected areas

1.1 Overview of research aims

This thesis was designed to explore the links between livelihoods and protected areas in the Lagoas de Cufada Natural Park (LCNP) in Guinea-Bissau, West Africa. The main goal of this research was to assess the relationship developed by local human communities with the forest and other animals, in particular non-human primates (NHP). A relationship assessment involves the measurement of attitudes and knowledge of perceptions and meanings given by locals to their surrounding biodiversity (Smith & Mackie, 2007; Vala & Monteiro, 2002; Yzerbyt & Leyens, 2004). Complex attitudes are constructed from individual, social, political and economic contexts, and these inform actions and reactions towards biodiversity (Baron, Byrne, & Branscombe, 2007; Fazio & Petty, 2008; Smith & Mackie, 2007).

To this aim I assess the economic context of the two major ethnic groups in the region, the Beafada and the Balanta, in order to describe their livelihoods risks associated with living within the protected area of LCNP in Guinea-Bissau. Additionally, salient perceptions of the local people towards LCNP will be evaluated for positive or negative valence in order to determine the costs and benefits associated with the formation of the Park for conservation purposes. Finally, perceptions and attitudes of wildlife by the local people will be evaluated since negative or positive attitudes regarding wildlife may determine if there is the capacity for sustainability of the wild animals within the boundaries of LCNP.

The choice of studying the two most representative ethnic groups living within the LCNP - the Beafada and the Balanta - not only will improve our knowledge about the population living inside the LCNP, but also allow for comparison between two different cultures and life stories as well as the understanding of how these cultural differences relate to attitudes regarding LCNP conservation.

1.2 Objectives and Hypotheses

The main aim of this thesis is to assess the relationship developed by human local communities, the forest and other animals, in particularly NHP in the LCNP (Guinea-Bissau, West Africa). My main aims are to: a) understand relationships between resource use, protected areas and local people's attitudes; b) identify problems for biodiversity conservation; and, c) to suggest potential solutions.

This research has three main hypotheses:

(1) Economic limitations and constraints on livelihoods imposed by the LCNP will impact on attitudes towards animals and the Park itself;

(2) Gender, ethnicity, cultural expectations and values will underlie attitudes and actions;

(3) Current mechanisms used to improve understanding of the potential benefits of biodiversity conservation may not enhance total compliance with biodiversity protection. Other mechanisms – via education and livelihood support – should be applied.

Specific hypotheses for each of the three data Chapters will be presented in those Chapters. The overall conclusions of my research will be shared with the local communities from the LCNP as with the group of guards who work inside it and the Institute for Biodiversity and Protected Areas [IBAP (entity responsible for the management of the protected areas in Guinea-Bissau)]. During my fieldwork I presented some of my results to these three identities, showing particularly concern about the hunting and bushmeat trade of NHP in the LCNP. All my results will be shared at the end of my study with the aim of suggesting an improvement of the conservation measures regarding primate's preservation.

It is also important to mention that the present research was part of a larger research and development projects (POCI/ANT/57434/2004 and PTDC/CS-ANT/099184/2008) classified both as Excellent and that had the FCT (Fundação para a Ciência e Tecnologia) as the main funding body.

1.3 Issues of conflict between livelihoods and biodiversity

Forest ecosystems, as key repositories of biodiversity, play a vital role in conservation. Regions with exceptional concentrations of endemic species (species found nowhere else) have been identified as *hotspots* and tropical wilderness areas, which guide many global conservation efforts (Mittermeier, 2004; Myers, Mittermeier, Mittermeier, da Fonseca, & Kent, 2000). The majority of these regions contain forest habitats of important value for conservation, the loss of which for agricultural expansion, or another form of development, would be particularly costly for conservation (Gorenflo & Brandon, 2005). Although forest

loss continues to be reported in Africa, this has slowed between 1990 and 2010. Planted forest area was increasing in Africa, particularly in the West and North (FAO, 2011).

It is often stated that rural populations depend or rely on natural resource products (non-timber forest products and animals) and thus that the forest is necessary to them (Fa, Currie, & Meeuwig, 2003; FAO, 1990; Milner-Gulland, Bennett, & SBC, 2003). A variety of such products have been shown to be important for livelihoods and food security, including wild plants, wild meat, fish, wood, reeds and honey (Shackleton & Shackleton, 2004). This dependency is particularly prevalent in the low and middle-income countries of Africa, Asia and Latin America. While some non-timber forest products can be exploited sustainable, others, such as hunted wildlife may be at risk of local extinction due to human activities. Habitat loss and hunting are considered major anthropogenic threats to wildlife across the world (Nelleman & INTERPOL, 2012; Stiles, Redmond, Cress, Nellemann, & Formo, 2013) but hunting of wild animals will be more of a threat to the conservation of biological diversity in the tropics over the next 15-25 years than will habitat loss, particularly in Central Africa (Robinson & Bennett, 2000; Robinson, Redford, & Bennett, 1999; Wilkie & Carpenter, 1999).

1.3.1 Bushmeat trade

The economy of large areas of the West African rain-forest zone is based on relatively intense agriculture and/or the commercial exploitation of natural resources, including timber and bushmeat (Oates, 1999, 2002). West African managed forests are zones in which domestic stock do not thrive, and bushmeat continues to be a major source of animal protein for many people, including those who have migrated to town and cities (Oates, 2002; Stiles et al., 2013). It is a cheap and easily-accessible source of nutrition, and plays a vital part in the diets, livelihoods and food security of rural households (Bowen-Jones, Brow, & Robinson, 2003), especially during the hungry season and in situations of stress and emergency (Chambers, 1997; Dei, 1989; de Merode, Homewood, & Cowlishaw, 2004, 2006; Pattanayak & Sills, 2001) or amongst vulnerable people, such as the poor and in food insecure periods (Allebone-Webb, 2009; Nasi & Cunningham, 2001; Neumann, Harris, & Rogers, 2002; Vedeld, Angelsen, Bojo, Sjaastad, & Berg, 2007). In rural Equatorial Guinea, wild plants and animals were consumed by households on over 50% of days (Allebone-Webb, 2009) whilst in the highlands of Sarawak bushmeat was part of 67% of all meals (Bennett & Robinson, 2000).

Studies looking at consumption, production and income demonstrated that bushmeat may be more important for income than as food, showing that over 90% of bushmeat and fish production is sold at market (de Merode et al., 2004; Kümpel, 2006; Nyahongo, Holmern, Kaltenborn, & Roskaft, 2009; Wilkie & Godoy, 2001). Forests and their products can provide an average of 22% of income (Vedeld et al., 2007). It is estimated that the rural income generated by bushmeat is at least equal to or more than, that produced by the formal logging industry (Usongo & Nagahuedi, 2008). Both subsistence hunting and the trade in bushmeat are often unsustainable (Brugiere & Magassouba, 2009; Noss, 1998; Robinson & Bennett, 2000). Given the rising human population levels across Africa (UNDP, 2006) the trade is deemed to be highly unsustainable, resulting in dramatic declines of local populations of wild animals (Brashares et al., 2004; Fa & Brown, 2009). There is a need to demonstrate this dependence between people and the bushmeat trade by developing accurate and cost-effective tools for monitoring changes in wildlife (Allebone-Webb, 2009). Unsustainable impacts on wildlife may be reduced through the identification and understanding of factors correlated with the consumption of bushmeat (Foerster et al., 2012).

1.3.2 Crop-raiding

Interactions between people and wildlife have increased in importance as issue for conservationists over the last 30 years, as a consequence of heightened forest degradation and land cultivation in rural Africa (Hill, 1997, 1998). Such interactions often take the form of crop-raiding by wild animals. A variety of vertebrate species are considered by local people as troublesome visitors to farmers' fields (Costa, Casanova, Sousa, & Lee, 2013; Hill, 1997, 1998; Lee, 2010; Naughton-Treves, Treves, Chapman, & Wrangham, 1998; Newmark, Manyanza, Gamassa, & Sariko, 1994; Strum, 2010). Primates in particular pose severe problems as crop-raiders (Lee & Priston, 2005; Naughton-Treves et al., 1998; Newmark et al., 1994; Strum, 2010). Primates are known by their physically ability, co-operative behaviour (Hill, 2000) and ability to evaluate risks and wait for a good opportunity to raid without being noticed (Strum, 2010). Studies on the behaviour and activities of monkeys in specific crop-raiding contexts are relatively scarce (Maples, Maples, Greenhood, & Walek, 1976; Priston, Wyper, & Lee, 2012; Strum, 2010; Warren, 2003; Warren, Buba, & Ross, 2007). It seems that monkeys have been forced into raiding as their natural habitats become reduced due to agricultural expansion (Priston et al., 2012). Great apes have also adapted to the *agriculturalisation* of their habitats by incorporating human foods into their diets (Hill, 2005; Hockings, 2007; Hockings & Sousa, 2011). Around African and Asian Reserves, primates are

considered responsible for over 70% of the crop damage events and 50% of the area damaged (Hill, 2000; Naughton-Treves et al., 1998). Furthermore, olive baboons (*Papio anubis*) from the Budongo Forest Reserve have been described as 'public enemy number 1' (Reynolds, 2005). They were perceived to be more destructive than other species, to come in greater numbers and to be especially persistent (Bennett & Ross, 2011; Dunn, 1993; Hill, 2000; Kamaya, 1996). Local farmers are unlikely to be sympathetic to aesthetic or ecological arguments promoting wildlife conservation when their very livelihoods are under threat (Balmford & Whitten, 2003).

However, studies focusing on crop-raiding report a disparity between actual and perceive loss, damaging crops by wild animals may be a contrived or perceptual response to other more substantial conflicts between people (Bennett & Ross, 2011; Gillingham & Lee, 2003). Populations living within Gumti National Park identify crop-raiding as a major concern, however farmer's estimations of the importance of animals pests do not always matched with the directs measures of crop-damage (Bennett & Ross, 2011). So, it is important to distinguish human-wildlife conflict among the *many* risks and problems faced by the local population (Bennett & Ross, 2011; Naughton-Treves, 1997; Newmark et al., 1994).

1.4 Theoretical background

1.4.1 Main approaches for understanding conflict between livelihoods and biodiversity

Several factors such as ecological, social, political and economic impose on all human-wildlife interactions, but the weight of each factor varies from one case to another (Galvin, Thornton, Pinho, Sunderland, & Boone, 2006). There has been a significant amount of research in the academic and policy literatures evaluating the impact of national parks and protected areas upon social and ecological landscapes (Adams, 2001; Adams & Mulligan, 2003; Zerner, 2000; Zimmerer, 2006). Much of this work has documented the ways protected areas restrict the ability of human populations to access resources necessary for livelihood production (Brown, 2002; Robbins, McSweeney, Waite, & Rice, 2006; Slater, 2002) or generate conflict between local people and national conservation agencies (Neumann, 1998; Robbins et al., 2006) often through the creation of expectations that are not met (Foale, 2001; Gillingham & Lee, 2003; Horowitz, 1998; West, 2006). Conflicts over resource appropriation, their wise use or conservation, and the role-played by local communities raise a number of important questions regarding natural heritage and environmental knowledge: the notion of natural heritage in the context of African countries; the actors and the logic of their strategies;

and, the effects of these processes in terms of their environmental and socio-dynamics (Cormier-Salem & Bassett, 2007). According to Cormier-Salem and Bassett (2007), the notion of heritage in African societies much refers to "western" systems of thought; however, the logics inherent to the decisions and choices of making heritage objects are complex whether they emanate from external organizations (e.g. WWF, IUCN) or local communities. Communities are often presented in homogenous terms (Agrawal & Gibson, 1999; Flint, Luloff, & Finley, 2008; Klein, Réau, Kalland, & Edwards, 2007). 'The local' is an intricate and complex amalgamation of trans-boundary political interests, economic dependencies, cultural and social ties, ecological circumstances, historical events and traditions (Wittmayer & Büscher, 2010). Understanding the complicated intersections between livelihood systems, education, migration, and other factors are needed to support the effectiveness of natural resource management (King & Peralvo, 2010). Also, the diversity of actors (external and internal) often produces conflicting views regarding resource management goals, because what is seen by some to be a natural heritage and worthy of conservation could be view by others as a constraint on development (Cormier-Salem & Bassett, 2007).

Exclusionary approaches to nature conservation founded on the conception of "nature" and human society as separate entities (Escobar, 1999; Oates, 1999; Sanderson & Redford, 2003; Terborgh, van Schaik, Davenport, & Rao, 2002), have been gradually substituted by a people-oriented approach that seeks to combine biodiversity conservation with social justice, assuming that environmental conservation will only be legitimate if local communities participate in management of natural resources and benefit from conservation (Ghimire & Pimbert, 2000; Gibson & Marks, 1995; Gillingham & Lee, 1999; Rao, Rabinowitz, & Khaing, 2002; Wilshunsen, Brechin, Fortwangler, & West, 2002). With more than 1.1 billion people living within the world's 25 biodiversity *hotspot areas* proposed by Myers et al. (2000) – in many cases on the 12% of the world's land area that is under some form of protected area management (Jenkins & Joppa, 2009; UNEP-WCMC, 2008), a clear distinction between the ecological impacts of traditional land use practices and those of more destructive activities such as logging, mining and industrial agriculture is needed (van Oudenhoven, Mijatovic,´ & Eyzaguirre, 2011). Global biodiversity continues to decline (Butchart et al., 2010; Joppa, 2012).

Community-based conservation involves the decentralization of management authority and distribution of benefits to affected communities with the belief that this will generate

incentives to support conservation planning. This has become a major strategy for conservation and development agencies operating in the developing world and produced numerous studies examining its opportunities and limitations (Adams & Hutton, 2007; Algotsson, 2006; Brown, 2002; Hulme & Murphree, 2001; Leverington, Costa, Pavese, & Hockings, 2010; Songorwa, 1999; Wilshusen et al., 2002). This approach has been criticized because of its simplistic assumptions (Campbell, 2000; Kellert, Mehta, Ebbin, & Lichtenfeld, 2000; Oates, 1999). According to some studies, local community members found their "participation" to be merely symbolic (Gibson & Marks, 1995; Songorwa, 1999), or used by local elites to further their own interests (Gibson & Marks, 1995; Gillingham & Lee, 1999; Kellert et al., 2000). However, technical ecological knowledge, long ignored by "western" experts, is now viewed not only as a tool of conservation biology (see section 1.4.2) but as in itself a heritage object worthy of conservation (Bérard et al., 2005).

1.4.2 Environmental and Cognitive Anthropology

Environmental issues have attracted growing interest in anthropology in the past decade (Biersack, 1999; Ingold, 1990; Kottak, 1999; Little, 1999; Moran, 1990; Scoones, 1999; Peace, Connor, & Trigger, 2012). Anthropologists' increasing interest on globalization, environmentalism, and political ecology have made them more involved in institutions such as the World Conservation Union and the Society for Conservation Biology's Social Science Working Group (West & Brockington, 2006).

Ecological anthropology appeared by the mid-twentieth century, as a result of the relationship between culture and ecology (Peace et al., 2012), which laid the foundation for anthropology's more recent engagement with environmental issues, where in addition to a local and regional focus, national and international levels have become crucial when studying the relationship between people and protected areas (Joppa, 2012; Kottak, 1999). Environmental anthropology attempts not only to understand but also to find solutions to problems such as environmental degradation and, action and sustainability blending theory and analysis with political awareness and policy concerns (Abel & Stepp, 2003; Biersarck, 1999; Kottak, 1999; McCabe, 2004). Ecosystem ecology should be of interest to anthropologists since they aim to understand the present, historic, and prehistoric provisioning of humanity; ecosystems and complex systems as models of structure, function, and dynamics can be applied to "human ecosystems" studies (Abel & Stepp, 2003; Kottak, 1999; Moran, 1990).

When forest users are in conflict with protected areas and conservation plans and regulations, identification of the level of dependency on the resources available in the protected area for their livelihoods is needed (Mulder & Coppolillo, 2005; Naughton-Treves, Holland, & Brandon, 2005; Salafsky & Wollenberg, 2000). Another subfield of environmental anthropology is biodiversity conservation, which introduces the notions about the "rights" and value of plants and animals versus those of humans (Kottak, 1999). However, anthropological approaches including other animals as the "other" are still rare (Alger & Alger, 2002; Arluke & Sanders, 1996; Costa, 2004; Franklin, 1999). Anthropology, like many other social sciences, has not ceased to be influenced by the so-called Judeo-Christian paradigm, which is characterized, among other things, by an anthropocentric vision (Arluke & Sanders, 1996; Casanova, 2006; Costa, 2004; Franklin, 1999; Nibert, 2002). Prejudice was what ultimately "justified" the categorization of humans into different categories; many different scales were created where humans were cataloged according to specific social representations. The prejudice against other species is nothing more than the same procedure giving rise to different socio-zoological scales where they are classified as "good" or "bad" animals (Arluke & Sanders, 1996). These scales vary enormously according to different religious paradigms: while for example in the Hindu paradigm non-humans animals and nature itself are perceived in an "inclusive" way (a human being may have been, in another life, a living being from another species), in societies influenced by the Islamic or Judeo-Christian paradigm the non-humans animals are perceived as "things" created with the purpose of serving the humans (Aiken, 2002; Albarracin, Johnson, & Zanna, 2005; Arluke & Sanders, 1996; Costa, 2004). To Franklin (1999) anthropocentrism and human dominance over the rest of the animal world can only be justified by the need to create distance between "humanity" and "animalist" (as if humans were minerals or any other element different from the animals). Nibert (2002) considers of great importance the development of studies that show increasing similarities between humans and other animals. Perceptions of the "other" may change according to categories such as age, gender, ethnicity, and other variables (Baron et al., 2007; McGarty, 1999; Smith & Mackie, 2007; Yzerbyt & Leyens, 2004), so the success of biodiversity conservation strategies depend on the understanding of these variables. Imposing "western" conservation strategies into the social context of local communities living in or around protected areas usually tend to fail (Kottak, 1999). Therefore, the use of communities' traditional local knowledge could be a way of managing natural resources and integrate them into conservation strategies (Armitage, 2003; Berkes, Colding, & Folke, 2000; Colding & Folke, 2001; Gadgil & Berkes, 1991).

Environmental anthropologists continue to undertake in-depth ethnographic studies of environmental issues, but in order to facilitate the process of cultural investigation and cross-cultural comparison binary categories can be used: nature/culture, human/non-human and native/alien (Peace et al., 2012). Ecosystems ecology within anthropology brings together international scholars in ecology and anthropology regarding the understanding of human ecosystems, such as cognitive anthropology (Abel & Stepp, 2003; Peace et al., 2012). According to D' Andrade (1995):

> Cognitive anthropology is the study of the relation between human society and human thought. The cognitive anthropologist studies how people in social groups conceive of and think about the objects and events which make up their world – including everything from physical objects like wild plants to abstracts events like social justice. (p. 1)

Schemata means "the building blocks of cognition," (Rumelhart, 1980), however "schema" is the most widely used term for theorizing about cognitive organization and function in cognitive science (Bobrow & Norman, 1975; Chafe, 1979; Hunt, 1982; Rumelhart, 1980). Although there is no review on the schema notion in cognitive anthropology (Casson, 1983), according to D' Andrade (1981) cognitive anthropologists are concerned with cultural schemata, which means "the cultural part of cognition". As Bloch (1991) mentioned "schemata are like small networks of typical understandings and practices concerning the world, clearly culturally created" (p. 185).

Like psychology, anthropology is also a cognitive science since it shares the same theoretical aim, which is to understand and explain the behaviour of the human species (Astuti & Bloch, 2012). Psychologists study how people think by formulating hypotheses and designing research strategies to test the hypothesis in controlled environments, which are intended to clarify the phenomenon; anthropologists, on the other hand, study what people think in the real context in order, through the use of theoretical knowledge, to identify the processes which led to the occurrence of the phenomenon (Astuti & Bloch, 2012; Atran & Medin, 2008; Casson, 1983). Both approaches are necessary as recent research has shown that content and process cannot be segregated, because cultural differences in what people think affect how people think (Atran & Medin, 2008; Bang, Medin, & Atran, 2007). Different

groups of people belonging to distinct cultures behave differently in the same physical environment (Atran et al., 2002). So perceptual and cognitive processes associated with the non-social world are also affected by culture (Bang et al., 2007).

The effectiveness of species conservation efforts, which are of primary interest for this thesis, depends upon perceptions of the species – to some extent the degree to which various wildlife species are liked or disliked, valued or devalued, or play a role in human existence (Kellert & Wilson, 1993). The most reliable research on environmental cognition stems from ethnobiology, or *folk-biology* which is a field that reflects the mind's ability to group natural discontinuities and to organize species into taxonomic kinds, based on an analysis in terms of culture and cognition (Atran et al., 2002; Atran & Medin, 2008). Humans feel the need to organize the knowledge of the natural world into sets of related categories where each species has an underlying essence that is uniquely responsible for their typical appearance, behaviour, and ecological preferences; this essence is responsible for the organism's identity (Atran, 1998; López, Atran, Medin, & Smith, 1997). Folk and scientific concepts may be different in kind, because folk concepts are more useful for a daily understanding of the world ("naive biology" as psychologists name it) and scientific concepts for exploring the cosmos at large (Bang et al., 2007).

There has been growing international recognition that traditional and local ecological knowledge can provide useful insights into the economic or social values attached to wild species to complement western scientific approaches (Berkes et al., 2000; Chemilinsky, 1991). The role of traditional and local knowledge has also become important in catalyzing new ways of managing environmental resources (Armitage, 2003; Gadgil, Berkes, & Folke, 1993; Kellert et al., 2000). Local ecological knowledge (LEK) means "a cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmission. [It concerns] the relationship of living beings (including humans) with one another and with their environment" (Berkes et al., 2000, p. 1252). Local knowledge of natural ecosystems can for example provide further empirical data on temporal trends in bushmeat prey type, availability and ranging behaviour (Berkes, 1999; Berkes et al., 2000; Chemilinsky, 1991). If hunters know that a species is rare and reproduces only infrequently, they may be more likely to avoid hunting that species beyond the intensity that it can sustain (Barros, Pereira, & Vicente, 2011); if they understand that certain animals only crop-raid when people have removed all the natural plant foods, they may choose to leave

natural buffers near fields to the advantage to humans and wildlife (McLennan, 2010) or alter their behaviour to minimize risks to humans (Sitati & Ipara, 2012). Greater understanding of what people know about the species that they live alongside or exploit is a further mechanism for conservation practitioners to gain access to the knowledge base that results in positive drivers for conservation (Borgerhoff Mulder, Schachat, Caro, Schachat, & Caro, 2009), or understanding the negative aspects of perceptions due to incomplete knowledge or understanding which result in the intensification of conflict paradigms and potentially, local extinctions.

1.4.3 Perceptions, attitudes and behaviours regarding conservation in protected areas

Perceptions are reflected in attitudes and in individual or collective behaviours (Smith & Mackie, 2007; Vala & Monteiro, 2002; Yzerbyt & Leyens, 2004). Social behavior depends, in part, on the way people interpret situations (Gleitman, 2002). Our concept of what is real is greatly affected by the confirmation of others. Perception allows us to look at the world, recognize familiar objects and be able to respond adequately to all of them (Gleitman, 2002; Vala & Monteiro, 2002; Yzerbyt & Leyens, 2004). People seek cognitive consistency to give a sense to the world around them, reinterpreting the information in order to fit it in their beliefs, attitudes and actions (Gleitman, 2002). Thus, the way we organize and categorize our perceptions about the "other" (Baron et al., 2007; Smith & Mackie, 2007; Yzerbyt & Leyens, 2004) - both human and non-human – is profoundly influenced by dimensions such as: religious, ideological, political and philosophical (Aiken, 2002; Albarracin et al., 2005; Casanova, 2006; Costa, 2004; McGarty, 1999). Additionally, prejudices about the "other" are also formed (Jones, 2002; Macrae, Stangor, & Hewstone, 1996; Nelson, 2006) as part of the process of social comparison (Baron et al., 2007; Smith & Mackie, 2007; Yzerbyt & Leyens, 2004).

Perceptions and social representations of the environment are reflected in attitudes and behaviors - individual or collective – (Vala & Monteiro, 2002; Yzerbyt & Leyens, 2004) which in turn reflect the allocation of certain meanings (Smith & Mackie 2007). Social changes necessary to the preservation of biodiversity and environment will have a greater chance of success if behaviors and attitudes change over time (Casanova, 2004). Tajfel (1981) understands social change as a change of relations between social groups, social classes, racial groups, national groups, etc. Changes in turn depend on social orientations which are associated with our social representations or perceptions of the reality (Casanova, 2004; Smith

& Mackie, 2007; Yzerbyt & Leyens, 2004). Social orientations represent cultural features; which usually are durable but not unchangeable, since their development depends on social relationships (Casanova, 2004; Smith & Mackie, 2007). Since human existence has evolved in a close association with nature, traditional African societies have developed a variety of adaptive strategies (Bodley, 1983). According to the authors Falloux and Talbot (1992), it is precisely this diversity of adaptive strategies that reflects the diversity of ethnic groups and, consequently, their cultures, historical ancestors, conflicts, and adaptation to different ecosystems. Each ethnic group perceives biodiversity according to their cultural framework and the way different cultures perceive other animals have changed over time, revealing the evolution of their various cultural frameworks, deeply influenced by religion, economics, philosophy, politics and other aspects (Bates & Fratkin, 1999; Harris, 1995). The knowledge acquired about different ethnic groups belief system allow for a better understanding of how "traditional" African societies understand ecosystems, environmental change and conservation in our days (Wane, 2005). Different social conditions provide different types of life experiences and that regularity in their social life contributes to the way individuals make judgments or cultivate orientations based on their relation with the world (Casanova, 2004).

According to Moscovici (1976), a social representation is a set of prepositions, actions and assessments transmitted by public opinion. However, these propositions, reactions and assessments are organized in different ways, according to classes, cultures or groups, and constitute many other universes of opinions, depending on the existing classes and cultures. Each of these universes has three dimensions - information, image and attitude. Information is related to knowledge; image is related to the specific aspect of the object of representation; and, attitude is related to the overall orientation, particularly evaluative, with respect to the object that could be positive or negative (Moscovici, 1976).

According to Eagly and Chaiken (1993) attitudes are not directly observable; they are an inference of the internal psychological processes of an individual, manifested through the observation of behaviours. Therefore, attitudes could also be characterized as a psychological tendency, because they are distinguishable from other hypothetical constructs, such as personality traits. Psychological tendency means an inner state, with some temporal stability but different from the one present in personality traits (Vala & Monteiro, 2002). Most authors (Smith & Mackie, 2007; Vala & Monteiro, 2002; Yzerbyt & Leyens, 2004) consider attitudes as learned and therefore changeable. The major consensus among social scientists comes from

the fact that attitudes have an evaluative element (Fazio & Petty, 2008) related to the way we evaluate people ("others"), objects and issues (Lima, 1993; Smith & Mackie, 2007; Vala & Monteiro, 2002; Yzerbyt & Leyens, 2004). Fazio and Petty (2008) characterize attitudes as brief trials of an object or event that help individuals structure their complex social environments. It is usual to find a separation between three types of evaluative responses that correspond to particular forms of attitudes expression: i) cognitive, which refers to thoughts, ideas, beliefs, and opinions; ii) affective, which refers to emotions and feelings caused by the attitude subject, and; iii) behavioural, which refers to behaviours or behavioural intentions in which attitudes could manifest (Fazio & Petty, 2008).

When empirical evidence concerning the attitude-behaviour relation appeared to challenge this assumption (Champbell, 1963; Deutscher, 1969; Festinger, 1964; Wicker, 1969) some investigators suggested that their impact on behaviour was moderated by situational factors, by personality traits, or by characteristics of the attitude itself (Kothandapani, 1971; McGuire, 1969). The problem of low correlation between attitude-behaviour was resolved in part when it was realized that, although general attitudes are poor predictors of single behaviours, they correlate strongly when the behavioural criterion is broadly representative of a behavioural domain, with multiple-act criteria or behavioural aggregates (Aiken, 2002; Ajzen & Fishbein, 2005; Fishbein & Azjen, 1974). On the other hand, attitudes are better predictors of behaviour when both attitude and behaviour are measured at the same level of generality or specificity (Aiken, 2002; Ajzen, 1988; Azjen & Fishbein, 1977; Fishbein & Azjen, 1975). However, recent research has suggested that there is a disparity between high levels of discriminatory behaviour and low levels of prejudice (Ajzen & Fishbein, 2005). If prejudicial attitudes could be measured free of social desirability bias and other self-presentational concerns, then it would be possible to predict discriminatory behaviour, because it is only when the behaviour is not consciously monitored or when motivation to control prejudiced reactions is relatively low that implicit attitudes are expected to predict behaviour (Aiken, 2002; Dovidio & Gaertner, 2004; Fazio & Olson, 2003; Sekaquaptewa, Espinoza, Thompson, Vargas, & von Hippel, 2003).

This thesis explores the relationships developed by human local communities with the forest and other animals in LCNP, so a relationship assessment involving the measurement of attitudes and knowledge of perceptions and meanings given by local people to their surrounding fauna and flora is necessary. Perceptions and attitudes from local people

regarding conservation in protected areas may depend on their impacts on poverty, that could be either positive or negative (Adams et al., 2004; Agrawal & Redford, 2009; Andam, Ferraro, Sims, Healy, & Holland, 2010; Brockington, Igoe, & Schmidt-Soltau, 2006; Lewis, Hunt, & Plantinga, 2003; Sanderson, 2005; Scherl et al., 2004; Temudo, 2012; Wilkie et al., 2006) and the impact of wild animals in terms of the damage caused to their crop fields and livestock (Hill & Wallace, 2012; Hill & Webber, 2010; Lee, 2010; Lee & Graham, 2006; Naughton-Treves et al., 1998; Newmark et al., 1994; Priston, et al., 2012; Strum, 2010).

1.4.3.1 Perceptions and attitudes of local people: *Protected areas impacts on poverty*

As discussed above, while parks can generate significant benefits (Andam et al., 2010; Balmford et al., 2002), considerable costs frequently accrue to communities living in or near protected areas due to species protection when these are edible or cause damage and/or exclusion from areas or resources (Brechin, Wilshunsen, Fortwangler, & West, 2003; Coad, Campbell, Miles, & Humphries, 2008; Igoe, 2006; Roe & Elliott, 2004). Support for conservation efforts partially depends on expectations of benefits by those impacted (Pfeffer, Schellas, & Meola, 2006). It is important that projects have a firm understanding of the value or appropriateness of benefits provided to the local community, for which an in-depth understanding of the complexities and needs of the population in question is critical (Gibson & Marks, 1995; Temudo, 2012). This subject is not new; however, research regarding the effectiveness of the protected areas in relation to poverty is lacking (Brockington et al., 2006; Ezebilo, 2012) because some studies fail to use direct measures of socioeconomic wellbeing and to control for confounding effects of geographical and baseline characteristics (de Sherbinin, 2008; Upton et al., 2008; Wittemeyer, Elsen, Bean, Burton, & Brashares, 2008). Since protected areas are frequently established in remote areas, to judge whether protected areas are responsible for exacerbating poverty, the appropriate comparison must be between communities living in or near protected areas and communities with similar characteristics and trends that are not affected by protected areas (Ferraro & Pattanayak, 2006; Wilkie et al., 2006).

According to Sirivongs and Tsuchiya (2012) local people's positive perceptions towards protected areas significantly influenced their attitudes and participation, but to sustain local participation, people must have more positive perceptions of the protected area mainly through ecotourism, eco-friendly income-generating or employment opportunities (Liu, Ouyang, & Miao, 2010; Paul & Chakrabarti, 2011; Vodouhe, Coulibaly, Adegbidi, & Sinsin,

2010; Wang & Yamamoto, 2009). Furthermore, an individual's social context (age, gender, education level, and ethnicity) may influence their attitudes and beliefs regarding human-environment interactions, consequently determine their behavioural intentions in a specific condition (Dunlap, Liere, Mertig, & Jones, 2000; Stern, Dietz, & Guagnano, 1995).

Women are often the primary users of forests when they are responsible for the food, fuel and water needs of their families, activities that require them to tend the land and gather products from forests (Agarwal, 1992, 2001; Badola & Hussain, 2003; Hill, 1998), but there are few studies that mention the issue of gender in shaping attitudes towards protected areas (Bauer, 2003; Costa et al., 2013; Gillingham & Lee, 2003; Hill, 1998; Naughton- Treves, 1997; Orga, 2008; Roe et al., 2000). Some studies suggested the importance of the dynamics within the household, since these could reveal important information about the differential control over resources, power hierarchies, and relationships between men and women (Agarwal, 1987; Folbre, 1988; Hart, 1992). According to Orga's (2008) study in Rajaji National Park in Uttarakhand – India, there is a disparity between men and women's vulnerability to human-wildlife conflicts and in her study only 50% of the respondents perceived that women are the more vulnerable. According to Hill (1998) men and women have different experiences regarding wildlife, which produces different attitudes regarding wildlife conservation; men expressed more positive attitudes towards conservation than women and one possible explanation for this could be that experience influences attitudes (Costa, 2010; Flinton, 2003; Hill, 1998).

Disparities and lack of opportunities for women are seen in all areas and sectors of Guinea-Bissau and could explain attitudes differences between men and women regarding wildlife conservation (e.g. Costa, 2010). Paradoxically, although having an important role in all civil areas, women suffer more than men from fewer opportunities in health, education and learning new skills (DENARP II, 2011; Moser, 2007). Women continue to have limited access to information because of their poor level of literacy and income, they also travel less than men and so have limited access to outside information transmitted for instance through newspapers, radios, or educational programmes (DENARP II, 2011; Esterhuyse, 2005; Hill, 1998; Ozanne, Humphrey, & Smith, 1999), but also because in most African territories, women are considered "second-class citizens" being always below men in the social hierarchical order. It seems though that the main reason that women engage in more negative

attitudes towards conservation is related with their lack of empowerment to become more involved (Lee, 2004; Moser, 2007; Ogra, 2008).

1.4.3.2 Perceptions and attitudes of local people: *Impact of wild animals in terms of damage caused*

As discussed above, rural villagers in Africa often face severe problems due to animal's species crop damage (Hill, 1997, 1998; Hill & Wallace, 2012; Kaltenborn, Bjerke, Nyahongo, & Williams, 2006; Lee, 2010; Lee & Priston, 2005; Naughton-Treves et al., 1998; Newmark et al., 1994; Priston et al., 2012; Strum, 2010). Often the lack of compensations regarding the crop damage results in greater dissatisfaction with wildlife conservation. Thus, information about the perceptions and attitudes of local people towards those animals, frequently called "pests", is of major importance for the design of effective management schemes acceptable to local people and other animals (Gillingham & Lee, 1999; Hodgkinson, 2009; Lee & Priston, 2005; Paterson & Wallis, 2005; Webber, Hill, & Reynolds, 2007).

All animal species have valuable ecological functions; however, perceptions of nature are structured by experiences, cultural norms and values and in some societies exist in a hierarchy of ranked values attributed to living organisms (Arluke & Saunders, 1996; Kellert, 1996; Kellert & Wilson, 1993). Dunlap and Van Liere (1978, 1984) found that those who expressed less concern about the environment tended to exhibit anthropocentric values; on the other hand, those more concern about environmental quality tended to exhibit biocentric values (non-human world has inherent value). However, biocentric values, by being indifferent to the preferences and needs of most people, convince few to follow it and have become an unrealistic theory (Kellert, 2009). Thus, a biocultural perspective was suggested as a "middle way" where values and ethic relations towards nature are bounded by biological requirements of species, but particularly influenced by culture, learning, and individual's experience (Kellert, 2009). This perspective incorporates not also the materialistic benefit of animals but also benefits derive from people's inclination to value nature for its aesthetic, emotional, moral and others qualities; as mentioned on the concept of "biophilia" (Kellert, 1997, 2009; Keller & Wilson, 1993; Wilson, 1984), which can be defined as "a complex of weak biological tendencies to value nature that includes material, aesthetic, emotional, intellectual, spiritual, and other basic dependencies on the natural world that contribute to human physical and mental well-being" (Kellert, 2009, p. 26).

Interactions between NHP and humans may reveal how meanings are created through their relationship with the environment (Arluke & Sanders, 1996; Franklin, 1999). Arluke and Sanders's research is often based in the unconscious way societies threat the animals (Arluke, 2001, 2003; Arluke & Sanders, 1996). The building of socio-zoological scales has the purpose of separating culturally salient "others" into "good" and "bad" animals, allowing people to treat the first ones with respect and affection, and the others with indifference or even cruelty. However, these constructs are flexible enough for a "good" animal to quickly become a "bad" one (Arluke & Sanders, 1996).

Primates are associated with a diversity of values from religious, food, medicinal, family members (pets) and pests (Hill & Webber, 2010; Lee & Priston, 2005). In general, when attitudes towards animal's species that create damage or threaten people are measured, the willingness to protect the animals is reduced (Gillingham & Lee, 1999; Heinen & Low, 1992; Kaltenborn et al., 2006). However, when primates behave in ways that meet people's expectations they are generally viewed positively, as for example the case of the chimpanzees that only eat the fleshy fruit part (usually this part is not for sale) from the cashew leaving the nut (Casanova & Sousa, personal observation, 2005; Hockings & Sousa, 2011). Factors like meat quality, appearance, and importance for tourism may contribute to more positive perceptions and attitudes on the animals (Entwistle & Stephenson, 2000).

Several factors have an influence on raiding, such as wild food availability, crop variety, season, distance from forest (Hill, 2000; Naughton-Treves et al., 1998) and the raiding frequency will impact on local people attitudes towards NHP (Hill & Webber, 2010; Lee & Priston, 2005; Priston et al., 2012). Particularly, when farmers engage in market economy, perceptions of the damage caused by crop-raiding tended to be worst (Lee & Priston, 2005). Furthermore, it is not uncommon to find that negative perceptions expressed on surveys which are not consistent with realities on the ground (Bennett & Ross, 2011; Gillingham & Lee, 2003; Hill, 1997, 2000; Naughton-Treves, 1997).

1.4.4 Why study biodiversity loss in Guinea-Bissau?

Guinea-Bissau is a small West African state with a population of 1.6 million (UNDP, 2013). Covering an area of 36,125 km^2, Guinea-Bissau's unique coastal zone includes mangroves, sandbanks and mudflats, shallow estuarine waters and sub-humid Guinean forests

that are known to be among the richest on the West African coast in terms of biodiversity [i.e. an abundance and variety of living organisms (IBAP, 2007)]. Guinea-Bissau is considered as the most forested country in West Africa, with about 72% of its territory covered by forest (FAO, 2011). From the standpoint of global biodiversity Guinea-Bissau has several compelling values: 1) extensive areas of sand banks hosting (a) one of the largest concentrations of migratory waterfowl from around the world, (b) African-manatee (*Trichechus senegalensis*), (c) corcunda (*Sousa teuszii)* and (d) bottlenose (*Tursiops truncatus)* dolphins (Rebelo & Catry, 2011); 2) four species of sea turtles (globally threatened) on the beaches of the Bijagós archipelago, particularly in the small island Poilão which is the third largest spawning ground of green turtles for the entire Atlantic Ocean; 3) a very curious population of hippopotamus, living also in this archipelago (in Quinara and Cacheu regions on the mainland); and, 4) in forests and wooded savannas of the south where there are still species of endangered large mammals such as buffalo, roan antelope, forest elephants and chimpanzees (see Table of the Species named in this Thesis). Leopards and lions have been historically sighted, but their current presence in the area is uncertain. Many large reptiles and a number of endemic plants are also found (IBAP, 2007; UNDP Project Document**,** 2009). Wild African dogs have also been spotted in Boé region (Casanova & Sousa, 2007).

The Institute for Biodiversity and Protected Areas (IBAP) in Guinea-Bissau was created in 2004 with the goal of managing the protected areas of the country, and currently Guinea-Bissau has a national network of six protected areas as: 1) *Orango* National Park; 2) *João Vieira e Poilão* National Park; 3) Islands of *Formosa Nago* and *Chediã* Community-protected Marine Area (the Urok islands); 4) *Cacheu* Mangroves National Park; 5) Lagoas de Cufada Natural Park; and, 6) Cantanhez National Park.

Rapid technological development, population growth and human migration are factors responsible for the pressure on natural resources. Guinea-Bissau has higher resource exploitation and degradation rates than do neighbouring countries (IBAP, 2007). Although the populations of these same countries sometimes "invade" Guinea-Bissau for their resources, the biggest threats are mainly internal. So, with habitat fragmentation and human pressures on natural resources increasing throughout the West African region, the few forested areas across the landscape are becoming the only area safe left for many of the endangered and threatened species of global importance. West African chimpanzees are a highly endangered species, as

well as the two species of colobus [(Western Black-and-white and red colobus) Casanova & Sousa, 2007; IBAP, 2007; UNDP Project Document, 2009].

The LCNP in particular also faces enormous challenges regarding conservation of its remarkable biodiversity such as: 1) deforestation; 2) hunting bushmeat for trade; 3) over-fishing; 4) exploitation of non-timber forest products (NTFP) and timber extraction; and, 5) increasing numbers of cashew plantations which have negative environmental impacts (IBAP, 2007). Guinea-Bissau is a biodiversity *hotspot*, but its sustainability is under pressure (Myers et al., 2000); since the ultimate goal of the large research project is to ensure that chimpanzees and other threatened NHP (see Table of the Species named in this Thesis) are protected from the intense deforestation and bushmeat trade (with pet market that accompanies bushmeat) presently occurring in this country (Cá, 2008; Casanova, 2008; Casanova & Sousa, 2005, 2006, 2007; Costa et al., 2013; Ferreira da Silva, 2012), Guinea-Bissau became a priority country for this research.

1.4.5 Non-human primate conservation status in Guinea-Bissau

Nearly half of the world's primates are threatened (Mittermeier et al., 2009; Oates, 2005). The 2012 IUCN Red List of Threatened Species assessment about the status of 634 primate taxa classified 303 (47.8%) as threatened – Vulnerable, Endangered or Critically Endangered – including: 37% of the African primates, 43% of the lemurs, 71% of the Asian primates and 40% of the Neotropical primates (Mittermeier et al., 2009).

The major causes of decline in primate diversity in Africa are usually related to human population growth and activities responsible for habitat loss and hunting (Di Fiore, 2004; Mittermeier et al., 2009) that could fall into four correlated categories: deforestation, hunting and live trade, diseases (Chapman, Lawes, & Eeley, 2006; Stiles et al., 2013) and climate change (Chapman et al., 2006). Due to their threatened status NHP in Guinea-Bissau have special importance (see Table 1.1).

Table 1.1: List of the non-human primates present in Guinea-Bissau (http://www.iucnredlist.org/).

Common name	Scientific name	Creole name	IUCN status[1]	Trend[2]
Chimpanzee	*Pan troglodytes verus*	Dári	EN	D
Western Black-and-white colobus	*Colobus polykomos*	Sancho fidalgo	VU	U
Red colobus	*Procolobus badius temminckii*	Fatango	EN	D
Campbell's monkey	*Cercopithecus campbelli*	Sancho mona	LC	U
Baboon	*Papio papio*	Kón	NT	U
Patas monkey	*Erythrocebus patas*	Sancho fula	LC	D
Sooty mangabey	*Cercocebus atys*	Sancho preto ou kankolma	VU	D
Green monkey	*Chlorocebus sabaeus*	Sancho tarrafe	LC	S
Bush baby	*Galago senegalensis*	Sancho	LC	S
Lesser spot-nosed monkey	*Cercopithecus petaurista*	Sancho	LC	U

[1] LC – Least Concern; NT – Near Threatened; VU – Vulnerable; EN – Endangered.
[2] U – Unknown; S – Stable; D – Decreasing.

However, researchers on the field pinpoint a decreasing population of some NHP during rekeys, censuses, survey questionnaires specifically targeting hunters and other methodological techniques: that is the case of baboons, Lesser spot-nosed monkeys, Campbell's monkeys, and Western Black-and-white colobus (Casanova & Sousa 2005, 2006, 2007; Casanova, 2008; Ferreira da Silva, 2012; Minhós, 2012; Sousa, Barata, Sousa, Casanova, & Vicente, 2011). In Guinea-Bissau, hunting of primate species is illegal; however, large quantities of primates are still hunted for the bushmeat trade (Cá, 2008; Casanova, 2008; Casanova & Sousa, 2005, 2006, 2007; Ferreira da Silva, 2012; Gippoliti & Dell'Omo, 2003). Women from Bissau named "bideiras" (Cá, 2008; Casanova & Sousa, 2007) buy primate bushmeat to increase their business in Bissau and they exchange money, cigarettes or bullets for bushmeat (Amador, unpublished data, 2011). Bushmeat trade occurs especially along the main roads or by boat with Bissau as their destination (Cá, 2008; Casanova & Sousa, 2005, 2006, 2007; Gippoliti & Dell'Omo, 2003).

Green monkeys and Campbell's monkeys were found to be the most traded species (Ferreira da Silva, 2012) along with baboons in Guinea-Bissau (Cá, 2008; Casanova & Sousa, 2005, 2006, 2007; Ferreira da Silva, 2012). Green monkeys and Campbell's monkeys are those trapped more because they are relatively easy to find and their meat is particularly appreciated (Ferreira da Silva, 2012). Although baboons ranked third during this research, since baboons are bigger than the other primates (chimpanzees not included) they tend to have a higher value and for this reason are desired (Amador, unpublished data, 2011; Cá, 2008; Casanova, 2008; Casanova & Sousa, 2005, 2006, 2007), but their relative rarity suggests difficulty in finding this species (Cá, 2008) due to drastic population decreasing (Casanova, 2008; Casanova & Sousa, 2005, 2006, 2007).

The chimpanzee (*Pan troglodytes*) is found in 21 countries across Equatorial Africa (Stiles et al., 2013) but is extinct in four countries: Gambia, Benin, Burkina Faso and Togo (Ginn, Robinson, Redmond, & Nekaris, 2013; Oates et al., 2008). The subspecies of chimpanzee (*Pan troglodytes verus*) present in Guinea-Bissau is estimated to have experienced a significant population reduction in the past 20 to 30 years due to disease (Boesch & Boesch-Achermann, 2000), and this reduction is suspected to continue (Humle et al., 2008). Chimpanzees are suggested as close to extinction in Senegal and Guinea-Bissau (Kormos, Boesch, Bakarr, & Butynski, 2003). Chimpanzees are not hunted for bushmeat consumption or trade (Brugiere & Magassouba, 2009; Casanova & Sousa, 2005, 2006, 2007; Gippoliti, Embalo, & Sousa, 2003), however there is an illegal trade network from the southern region (Boe´ province, Quinara and Tombali Regions) to Bissau for pet trade (Casanova & Sousa, 2006, 2007) and for medicinal purposes (Sá, Ferreira da Silva, & Minhós, 2012).

The Western red colobus species was defined by IUCN (2013) as Endangered and estimated to have undergone a decline exceeding 50% over the course of three generations (27 to 300 years) and this reduction is also projected to continue (Galat-Luong et al., 2008). Vulnerable species such as sooty mangabey and Western Black-and-white colobus are estimated to have undergone a decline exceeding 30% over the past 30 years, and on the order of about 20-25% in the case of baboons (Oates, Gippoliti, & Groves, 2008a, 2008d, 2008e). Species classified as of least concern by IUCN (2013) as Campbell's monkeys, patas monkeys, green monkeys, bush babies and Lesser spot-nosed monkeys are widespread and although they are facing threats from habitat loss and hunting, they can persist in a wide

variety of degraded habitats (Bearder, Butynski, & De Jong, 2008; Casanova & Sousa, 2007; Kingdon, Butynski, & De Jong, 2008; Kingdon & Gippoliti, 2008; Oates, Gippoliti, & Groves, 2008b, 2008c).

1.5 *Thesis structure*

To accomplish the project aims, I collected both quantitative and qualitative information near the two most representative ethnic groups living within the LCNP - the Beafada and the Balanta - not only to improve the knowledge about the population living inside the LCNP, but also for comparison between two different cultures and life stories as well as to understand how these cultural differences could be related with attitudes regarding LCNP conservation. Understanding the implications of attitudes for conservation required first establishing the political, economic and development context of the country, in this case, Guinea-Bissau (Chapter 2). This research combined both quantitative and qualitative methodology as mentioned above (Chapter 3). Questions on the assessment of the economic context of the two major ethnic groups, Beafada and Balanta, were assessed in order to describe their livelihoods risks by living within a protect area as LCNP (Chapter 4). Additionally, reported perceptions of the local people towards LCNP were evaluated in order to determine the costs and benefits associated with the formation of the Park for conservation purposes (Chapter 5). Perceptions and attitudes of wildlife by the local people were also evaluated since negative or positive attitudes regarding wildlife may determine if there is the capacity for sustainability of the wild animals within LCNP boundaries (Chapter 6). Finally, main findings of the study were put together and conservation recommendations and implications were discussed regarding if there is any future for the wildlife in this protected area, as well as its chances of success as a protected area (Chapter 7).

Chapter 2

Study Site

This thesis explores the relationships developed by human local communities with the forest and other animals in LCNP, as explained in Chapter 1. A relationship assessment involves the measurement of attitudes and knowledge of perceptions and meanings given by local people to their surrounding fauna and flora. Perceptions of the ethno-sphere features are reflected in attitudes and in individual or collective behaviours (Yzerbyt & Leyens, 2004). Attitudes are constructed from individual, social, political and economic contexts. Conservation efforts without considering local people may be doomed to fail. Understanding the implications of attitudes for conservation requires first establishing the political, economic and development context of the country, in this case, Guinea-Bissau.

2.1 Guinea-Bissau

Guinea-Bissau is a small West African state with a population of 1.6 million (UNDP, 2013). Its territory includes parts of the African mainland as well as a group of approximately 90 islands (the Bijagós Islands), most of which are uninhabited (UNODC, 2010). The continental area of Guinea-Bissau covers 34,500 km^2 and the Bijagós archipelago 1,625 km^2 [(Gippoliti & Dell´Omo, 2003) see Figure 2.1].

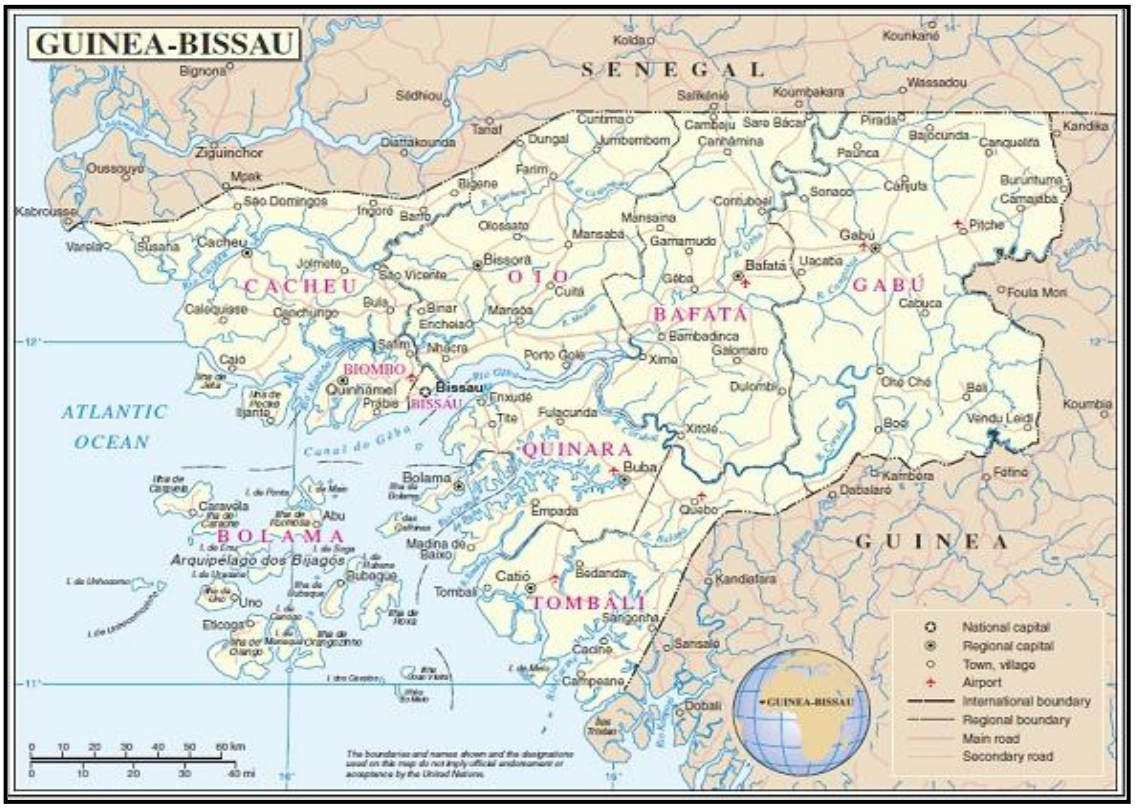


Figure 2.1: Map of the Republic of Guinea-Bissau adapted from "Regional Programme for West Africa 2010 – 2014" United Nations Office on Drugs and Crime (UNODC).

2.1.1 Political Evolution

In the 1970s hopes were high that Guinea-Bissau would be one of the forerunners of an Africa revolution against colonialism, along with Angola and Mozambique. During the liberation war both leaders and rural rebels forged a unity in order to eliminate colonial institutions and colonial power and oppression over centuries, and simultaneously, transform the economy. The *Partido Africano da Independência da Guiné e Cabo-Verde* (PAIGC) came to symbolize this unity (and the struggle against Portuguese colonialism) (Galli & Jones, 1987) whose first militant and founder was Amílcar Cabral (Banco Nacional da Guiné-Bissau, 1977). PAIGC declared its intention to give priority to rural development providing health and educational facilities. Guinea-Bissau was seen as a model for both political and economic development in African context (Galli & Jones, 1987). Contacts were made with the Portuguese State in order to ensure the transfer of power over the entire colony of Guinea-Bissau and Cape Verde by peaceful means, but in 1963 when all possibilities of peaceful solutions had been denied, PAIGC initiated a national rebellion to fight for the liberation of the country (Banco Nacional da Guiné-Bissau, 1977; Lopes, 1982).

One year after this first attack in 1963, the Portuguese colonial army suffered a significant military defeat. When, in 1972, the UN visited the free areas, Portuguese colonial authorities tried to show control over the territory but, in 1973 Amílcar Cabral unilaterally declared the independence of the country. On January 20th 1973, he was murdered in Ratoma-Conakri (Lopes, 1982). According to Nóbrega (2003) doubts about who was guilty of his murder remain especially between the Portuguese and the president of Guinea-Conakry at the time, Sekou Turé. However, it was widely publicized at the time that the master mind behind the murder was the Portuguese General Spínola who paid to some of Cabral's personal guards to assassinate him.

Portugal recognition of the independent state came only in 1974 with the Portuguese *25 of April Revolution*. Throughout Luis Cabral´s period as president of the Republic of Guinea-Bissau (1974 – 80), his fear of attacks by rivals or dissident groups based in Senegal, particularly after November 1978, created an atmosphere of fear both among party people and in the population at large. Nevertheless, it was the time when the State built schools, health care centers, roads, district hospitals, installed a social security system along with other benefits for the population. It was a time for hope. After the liberation war the country proceed to nationalize the major productive sectors such as the industrial and agro-industrial

departments. The State supported mainly two departments: agriculture and industry. The country's agricultural system experienced great development during this time. Several factories were built and machinery was introduced in rural work. Luis Cabral's "successor" was not democratically elected: João Bernardo Vieira (Nino) attempted several *coups* against Luis Cabral and was finally successful. Members of the government were also involved and participated in some of the *coups*. "Nino" came to power after a successful *Coup d'Etat* in November 1980 (Galli & Jones, 1987), continuing to rule with only one party (Guimarães, 2007; Lopes, 1982; Nóbrega, 2003).

Meanwhile, the country's industrial sector collapsed (Lopes, 1982; Nóbrega, 2003). "Nino" stopped paying the salaries of teachers, medical doctors, nurses, and other technical staff and this situation was prolonged throughout almost two decades. The only exception to this treatment was the military. In 1990 PAIGC officers accused "Nino" of stealing the State assets and he was expelled from the country. Economic reforms imposed by the World Bank (and negotiated by "Nino"), had a decisive role in political change, because the regime was unable to independently produce wealth and was constantly depended on external financial "help" in order to guarantee some peace and appease the military. If the funding ended "Nino" would have to deal with protests from the population and military instability so the unbearable pressure from donors towards a plural-party system was one of the main reasons for this political change (Nóbrega, 2003). However, due to continuing political instability, Guinea-Bissau has experienced several political and democratic weaknesses; electoral victories seem to depend on subjective factors such as ethnicity, which have little to do with the ability to govern (Guimarães, 2007).

Since "Nino", several *coups* and political assassinations have taken place. The fragility of the country has made the territory susceptible to Colombian drug cartels that use the country as a platform to enter cocaine and other illegal substances in Europe. Military and political staff are said to be involved with different drug cartels (Ellis, 2009; Felbab-Brown, 2010). Guinea-Bissau is very far from being the country that Amílcar Cabral (the *father* of the Nation, as it is named) imagined and planned.

2.1.2 Economic Situation

After a long recession from the beginning of the year 2000, followed by a slight recovery in 2007, Guinea-Bissau's economy entered into a new growth momentum from 2008

onwards. Thus, despite an unfavorable environment (political and institutional instability, several shortages of basic economic infrastructure, including energy, potable water, transport and oil) with PAIGC's people in the government the average growth between 2008 and 2009 was 3.1%, an improvement over 2006 and 2007 results (1.2%), but still below the 5% target set by the first National Strategic Document for Poverty Reduction. By 2010 this rate had increased to 3.5%; growth was a primarily result of agricultural expansion (6.3% in 2009), with a noticeable influence of cashew exportation (DENARP II, 2011).

The budget deficit between 2005 and 2007 of more than 10% of GNP (Gross National Product) was reduced to 3.2% in 2008 and 3% in 2009 due to a better mobilization of internal receipts and expenditure control. Also, several initiatives took place such as: 1) construction and rehabilitation of some major arteries in Bissau city; 2) studies regarding 500 km road construction linking Guinea-Bissau to neighboring countries (Guinea-Conakry and Senegal); and, 3) maintenance of 400 km of existing roads. However, due to the constraints and difficulties related to funding, institutional instability and human capacities in the implementation of development projects on schedule, the results remain below the targets set (DENARP II, 2011).

Guinea-Bissau has been in receipt of funds from organizations such as: 1) World Bank (WB); 2) International Monetary Fund (IMF); 3) United Nations (UN); 4) European Union (EU); and, 5) African Development Bank (Guimarães, 2007; Vieira, 2004). An International Monetary Fund (IMF) mission to Guinea-Bissau during March 1–14, 2012 made the following conclusion (2012):

> Guinea-Bissau made further progress in stabilizing its economy in 2011. Economic growth reached 5.3 percent, driven by exceptional prices for cashew (the predominant export) and a robust cashew harvest. Further progress is needed in areas of extending the unification of payroll system to all ministries and preparing a plan to manage the country's natural resources. Despite a more challenging international environment, the growth outlook for 2012 is favorable. If the external environment is to weaken further, economic growth would be harmed through channels such as exports and remittances.

> Political stability and improved security will continue to be critical for economic activity (Press Release No. 12/73).

The economic situation in Guinea-Bissau is particularly influenced by four important factors: 1) it has a very high level of dependence on one export - cashew, which is grown by the majority of the population in the country and represents 98% of the export receipts; 2) Guinea-Bissau depends on highly deteriorated infrastructures; 3) it has an enormous dependency on rice importations, the main food item; and, 4) fish exports are an important source of public receipts, but there seem to be lack of vigilance and reinforcement of the law against illegal boats in Guinea-Bissau waters (English, 2010).

Guinea-Bissau is the sixth largest exporter of unprocessed cashew nuts in the world. Cashew farmers cover 73% of the country's arable land and most depend on the crop for cash income to buy imported rice (Barry, Creppy, & Wodon, 2007). According to Oom and co-workers (2009) a marked decrease in closed forest (due to increased cultivation of subsistence crops and conversion into cashew plantations – see also Casanova & Sousa, 2007) can be seen in Guinea-Bissau, the latter occurring at an annual conversion rate of approximately 4% (Barry et al., 2007).

Furthermore, employment situation especially for young people has not improved much. The employment rate for the age group between 15-24 years is 10.6% in 2009, with a rate of 4.6% for women. With unemployment and underemployment among youth, the unemployment rate is probably about 30% (DENARP II, 2011). However, with the National Programme of Agriculture Investment (NPAI), government has fixed primary goals for the next 15 years with priority investments into: a) cashew and rice production; b) cattle-raising, due to its strong relation with poverty reduction and food security; c) mango exportation, to encourage diversity in the products exported; d) gardening, due to its relation with poverty reduction, self-employment (specially to women) and food security; e) fishing due to its export and food security potential; f) financial services development; and, g) reinforcement of the support and counseling services in every sectors (DENARP II, 2011).

2.1.3 Development and Social Context

Cultural diversity in Guinea-Bissau is extraordinary with approximately 30 ethnic groups that remain connected to their respective territories and cultures. Given the size of the

territory it is natural to find ethnic groups with totally different customs separated only by a *small forest* or even living in the same small villages. Although cultural changes in Guinea-Bissau seem to be few, the population seems to be desirous of change as shown by: 1) the massive exodus of rural youth to urban areas; or, 2) the changes in employment relationships where family co-operation is being substituted by the labour market (Nóbrega, 2003).

Guinea-Bissau is one of the poorest countries in the world, occupying the 176th position among 187 countries in a human development rank in 2012 [see Table 2.1 (UNDP, 2013)]**.** Inhabitants in Guinea-Bissau live under absolute poverty (with an income of less than US$2 per day), compared with 49% in 1991 (OCDE, 2011). Indeed, the results of the *Inquérito Ligeiro para Avaliação da Pobreza* (ILAP) indicate that 69.3% of Guineans are poor and 33% are extremely poor, an increase of 5 and 13 percentage points respectively compared with the year 2002. This clearly shows the increase of the extreme poverty especially after Nino's *coup d'état*. In Bissau region, poverty rate was sustained at the same level (51%), while in other regions this has been reduced. The regions most affected by extremely poverty are Cacheu, Bafatá, Tombali and Quinara (my thesis study area). In 2010, 57% of the children between 5 and 14 years of age were working, with higher incidence in rural areas (65%) compared with the urban (45%) ones (DENARP II, 2011).

The two main factors that contribute to Guinea-Bissau low Human Development Index are: a wide range of poverty, with very low monetary income, and life expectancy (48.66 years) resulting from health services of very low quality and with major difficulties in accessing these, leading to higher rates of maternal and infant mortality (DENARP II, 2011; OCDE, 2011). There are also strong disparities between urban and rural areas and between men and women in terms of access to: 1) remunerative employment; 2) education; and, 3) health services (OCDE, 2011).

The General Government Budget (GGB) investment in the social sectors stands at 22% - well below the 40% internationally recommended in order to respond to population needs and to achieve the goals stands by the Millennium Development Goals [MDG (OCDE, 2011)].

Table 2.1: Human Development Index (UNDP, 2013)

Year	Guinea-Bissau	Low human development	Sub-Saharan Africa	World
2005	0.348	0.424	0.432	0.666
2007	0.355	0.442	0.449	0.678
2010	0.361	0.461	0.468	0.690
2011	0.364	0.464	0.472	0.692
2012	0.354	0.466	0.475	0.694

2.1.3.1 Education

Analysis of the Guinea-Bissau educational system reveals that children continue to struggle with a difficult educational path, despite recent progresses to improve the national education system. Only 19% of children, with age above 3 and until 6 years, benefit from kindergarten. For children of 3 years or under there are no specific public early learning services, only private initiatives (Relatório Anual sobre a Situação dos Direitos Humanos na Guiné-Bissau, 2007).

Guinean schools depend mainly on international and NGO help (UNDP, 2006). According to this report, only 56.6% of all schools in Guinea-Bissau (public, private and the Islamic school: *madrassa*) can offer the complete period of compulsory education – which, in the case of Guinea-Bissau, should be 6 years (from ages 6 to 12). An inadequate educational system, lack of teachers, no proper infrastructure, insufficient school materials, long distances that children have to travel (on foot) to attend school and an almost non-existent network of public transport are some of the major barriers that make the access to education so difficult for children (Relatório Anual sobre a Situação dos Direitos Humanos na Guiné-Bissau, 2007; UNDP, 2006).

In general, 45.3% of children attended school in 2000 and 67.4% in 2010. While this is an improvement over the decade the number of girls who abandoned school is higher when compared with boys. For both secondary and higher levels, 33.8% of girls attend school compared with 65.9% of boys. In 2009, 57% of girls abandoned school (43.6% of boys) and in 2010, only 15% of girls had attended secondary school against 23% of boys. Illiteracy is high in the whole Guinean territory, at 56% in 2009. In 2010, the literacy rate for women, with age between 15 and 24 years, was 39.9%, 50.4% in Bissau and only 9.7% in rural areas.

Beside regions such as Bissau, Bolama-Bijagós and Cacheu, the literacy level is very low, especially in regions such as Oio and Tombali (DENARP II, 2011). Finally, regarding human resources, teachers' qualifications are also very low. Only 10% of the primary school teachers were graduates. Furthermore, low salaries and no proper living conditions in rural areas contributed to the difficult recruitment of qualified teachers for some regions, especially the most needy and remote as previously mentioned (Relatório Anual sobre a Situação dos Direitos Humanos na Guiné-Bissau, 2007).

2.1.3.2 Health

In 2010, more than a half of Guinea-Bissau's population had access to safe water sources. However, the gap between urban and rural areas continues to be high; 53% of families living in rural areas used safe water sources, while this percentage in urban areas was 84%. This feature was responsible for hours of travelling to get water, particularly by women and girls in rural areas, which has an impact on women/girls literacy rate, health status and productive ability (DENARP II, 2011). Regarding sanitation, about 35% of the population had no toilets; there was a massive use of poorly designed latrines which represent a great danger for public health. There are no sewer systems or organized system for collection, removal and treatment of urban waste. It is estimated that waterborne diseases are responsible for ¾ of communicable diseases and more than half of deaths (Relatório Anual sobre a Situação dos Direitos Humanos na Guiné-Bissau, 2007).

In 2010, the prevalence of HIV/AIDS was estimated to be 3.6%, with a higher rate for pregnant women (5%). As in most African countries, this disease affects primarily young girls with age between 15 and 18 years. This has dramatic effects on children: 1) those who will be born from HIV- positive mothers (with HIV/AIDS); 2) those who will not be able to attend school due to the inability of the mother to defray expenses; and, 3) those who will be orphaned (DENARP II, 2011). Contraception is almost non-existent. According to the UNDP (2006), only 1% of the Guineans living in rural areas knows about and has access to condoms. Premature pregnancies, non-existent medical assistance at birth and a short interval between pregnancies were responsible for a high percentage of deaths during and after deliveries. Hemorrhages, infections and eclampsia are among the risks that Guinean women take while having babies (UNDP, 2006). NGOs operating in this area recognize that condom use is often rejected by the male partners, particularly in the marital context, even knowing that the woman/girl is HIV positive (DENARP II, 2011).

Guinea-Bissau government has not been proven to be competent and reliable in managing the health problems faced by the health system. The country has one of the higher rates of women's and infant mortality (see Table 2.2): 1) one in ten children (104 per 1000) die before their first birthday; and, 2) women's mortality rate is still considered one of the highest in the region (818 per 100.000 births comparing with 556 in Gambia, 980 in Guinea-Conakry, 648 in Niger, 800 in Nigeria and 401 in Senegal). Female genital mutilation also affects women´s health, 50% of women with age between 15 and 49 were circumcised and the prevalence affects more or less 40% of girls with age between 0-14 are circumcised (DENARP II, 2011). Malaria (an endemic disease) remains one of the biggest problems of public health, being the primary cause of mortality among children under 5 years. This negative picture of the national health system is likely to continue due to the lack of money available for this sector and lack of incentives to health professionals, which leads to a concentration of experts in Bissau, denying the right to health to the rural population. In addition, there is only one medical doctor for 6.667 inhabitants in the country (Relatório Anual sobre a Situação dos Direitos Humanos na Guiné-Bissau, 2007).

Table 2.2: Health development (DENARP II, 2011)

Indicators	2000-2003	2005-2007	2009-2010
Rate of infant mortality ($^0/_{000}$)	122	138	104
Rate of infant-juvenile mortality ($^0/_{000}$)	205	223	155
Rate of women mortality ($^0/_{00.000}$)	822	800	818

Lack of health human resources, insufficient investment in certain areas of Guinea-Bissau and the poor accessibility of the population to existing health services, particularly for pregnant women and adolescents, are the main gaps of the health services in Guinea-Bissau (DENARP II, 2011).

2.1.4 Illegal drug situation

The numerous problems associated with the conversion of military forces, who fought for independence during the liberation war, into defense and security forces produced instability marked by several violent episodes of military uprisings (Relatório Anual sobre a Situação dos Direitos Humanos na Guiné-Bissau, 2007). In the past few years, this former Portuguese colony has been at the top of the international agenda due to its highly unstable

political situation and the increasing exploitation of the country as a major hub for cocaine trafficking from Latin America to Europe (Ellis, 2009; Felbab-Brown, 2010; UNODC, 2010). Ships and planes loaded with cocaine come from Latin America into poorly guarded ports and airfield strips in West Africa (Ellis, 2009; Felbab-Brown, 2010; UNODC, 2007; UNODC, 2008).

Drug trafficking is an example of the weakness of the government's authority and of the lack of state enforcement structures. Poor countries such as Guinea-Bissau – that are at the bottom of the human development index – are unable to control their coasts or airspace. Police are almost helpless against well equipped and well-connected traffickers. Drug seizures are growing dramatically – at least 46 tons of cocaine have been seized on route to Europe via West Africa since 2005 (UNODC, 2008). Drug trafficking can find a particularly favorable environment in under-governed regions, where the State is either too poor to assert authority or where insurgent groups have assumed some degree of control (UNODC, 2007). This phenomenon of drug smuggling becomes widespread all over the country with the protection of some people from the defense and security forces (Relatório Anual sobre a Situação dos Direitos Humanos na Guiné-Bissau, 2007) and corrupted politicians (Ellis, 2006, 2009; Felbab-Brown, 2010).

Uncertainties about short-term stability may encourage citizens, including public employees, to adopt illegal (and corrupt) practices. The fact that key security personnel (but not only) are underpaid, and often irregularly paid, contributes greatly to their vulnerability to corruption (UNODC, 2007; UNODC, 2010). In terms of vulnerability, Guinea-Bissau faces serious challenges: 1) the country is one of smallest and poorest countries in an already poor region; 2) complete lack of resources for State employees (including police personnel that have gone unpaid); 3) the country has a history of conflict and military dictatorships and under these circumstances, the ability of the executive to challenge some military leaders, despite repeated allegations of involvement in drug trafficking, may be limited; and, 4) the capital city Bissau is a port town and the country encompasses a large number of small islands in the Bijagós Archipelago with their own landing strips, which can be exploited by traffickers (UNODC, 2007), along with other airstrips in the south of the country (Tombali region).

2.1.5 Protected Areas

Guinea-Bissau's unique coastal zone includes mangroves, sandbanks and mudflats, shallow estuarine waters and sub-humid Guinean forests that are known to be among the richest on the West African coast in terms of biodiversity [i.e. an abundance and variety of living organisms (IBAP, 2007), see section 1.4.4 in Chapter 1]. However, with habitat fragmentation and human pressures on natural resources increasing throughout the West African region, the few forested areas across the landscape are becoming the only area safe left for many of these endangered and threatened species of global importance. Chimpanzees are a highly endangered species, as well as the two species of colobus [Western Black-and-white and red colobus (Casanova & Sousa, 2007; IBAP, 2007; UNDP Project Document, 2009)].

The Institute for Biodiversity and Protected Areas (IBAP) in Guinea-Bissau was created in 2004 with the goal of protecting the country's biodiversity, which has resulted in setting aside and effectively managing 536,972 ha of its territory in six coastal and marine protected areas (UNDP Project Document, 2009; World Bank, 2011). The rich natural heritage of Guinea-Bissau has attracted financial support from different organizations to conserve nature and promote sustainable development. Thus, over almost two decades successive governments working with NGOs have developed strategies and programmes regarding the management of the natural resources in the country. This effort began in the 1990s, led largely by local and international NGOs such as the International Union for the Conservation of Nature (IUCN). In 2004, through the Coastal and Biodiversity Management Project (CBMP) financed by the Global Environment Facility (GEF), the European Union, IUCN and the World Bank, helped the government establish five national Parks (*Cacheu* Mangrove National Park, Cantanhez National Park, Lagoas de Cufada Natural Park, *João Vieira* and *Poilão* National Marine Park and *Orango* National Marine Park) covering almost 450,000 hectares and including some 70,000 people, as well as a financially and administratively autonomous public agency to manage them, the IBAP as previously mentioned (World Bank, 2011).

The government also established the Fund for Local Environmental Initiatives (FIAL) through the CBMP to complement biodiversity conservation efforts and demonstrate tangible benefits to local communities from the parks in order to beside (a) conserve valuable biodiversity and ecosystem functions, also (b) serve as "sustainable development poles" for

the local communities and regions. FIAL is a mechanism that has provided block grants for pro-environment development in communities in and around the Parks (World Bank, 2011).

Currently, Guinea-Bissau has a national network of 6 protected areas with four being marine areas: 1) *Orango* National Park; 2) *João Vieira e Poilão* National Park; 3) Islands of *Formosa Nago* and *Chediã* Community-protected Marine Area (the Urok islands); 4) *Cacheu* Mangroves National Park; 5) Lagoas de Cufada Natural Park; and, 6) Cantanhez National Park [IBAP, 2007 (for more detailed information see Figure 2.2 and Table 2.3)].

Apart from these established protected areas, the current National Strategy for Biodiversity and Protected Areas, which covers the period 2007-2011, determines that the priority for consolidating the national protected areas estate should be the protection of terrestrial ecosystems, in particularly the Dulombi-Boé-Tchetche (DBT) Complex. This area of almost 319,000 ha constitutes a contiguous and organic mosaic of a variety of ecosystems and landscapes such as humid woodlands, savannahs, gallery forests, wetlands and lakes. The DBT Complex is particularly rich in plant and animal species. The proposed GEF-UNDP project will focus on the conservation of the DBT Complex, which includes the creation of two national Parks (Dulombi NP with 98,951 ha and Boé NP with 95,280 ha) and three wildlife corridors essential to ensure connectivity between the areas on the one hand, and to protect regional and trans-border migration routes [(UNDP Project Document, 2009) see Figure 2.2].

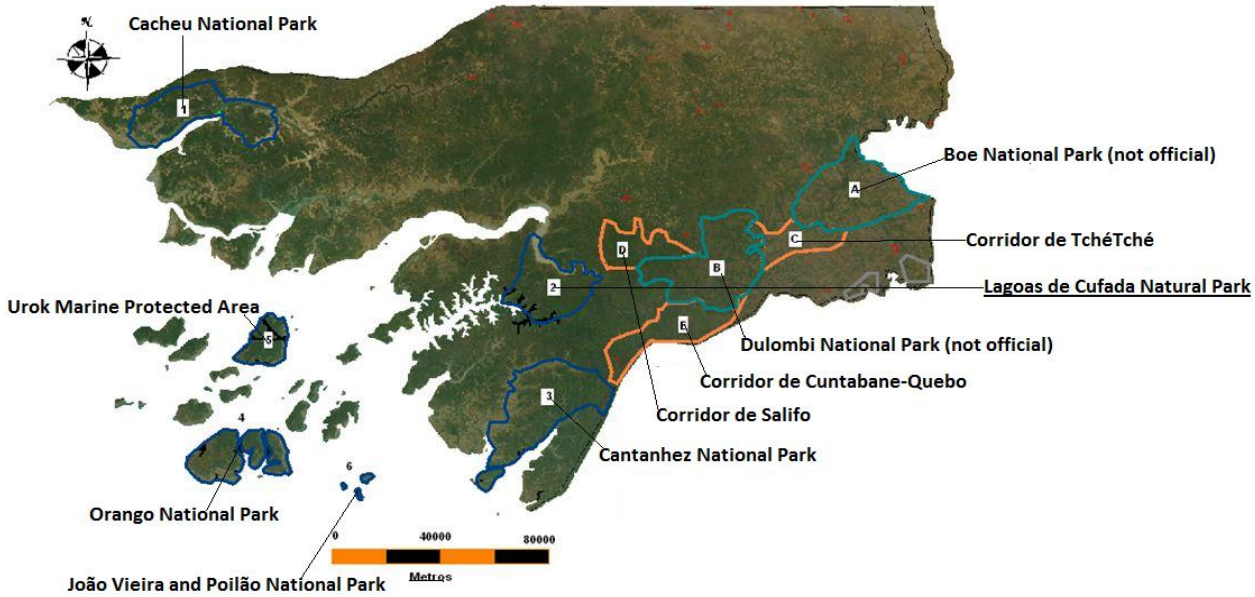


Figure 2.2: Map of Guinea-Bissau current and proposed protected areas including the Lagoas de Cufada Natural Park [2 (Adapted map from GEF)].

Table 2.3: Protected Areas in Guinea-Bissau (IBAP, 2007; UNDP Project Development, 2009)

Guinea-Bissau Parks	**Orango**	**João Vieira e Poilão**	**Urok islands**	**Cachéu Mangroves**	**Lagoas de Cufada**	**Cantanhez**
Type of Protected Area	National Park	National Park	Marine Protected Area	National Park	National Park	National Park
% of Territory	4.4%	1.4%	1.5%	2.2%	2.5%	2.9%
Area (ha)	158 000	49 500	94 000	80 000	89 000	105 700
Population (Thousands)	2.268	Uninhabited	2.572	7.930	3.534	20.000
Official Villages	33	-	33	41	33	110
Date of Official recognition	2000	2000	2005	2000	2000	2007
Principal threats	Capture of marine turtle eggs Illegal fishing Human/ Hippopotamus conflict	Capture of marine turtle eggs Illegal fishing Deforestation for agriculture	Invasion by non-resident fishermen Lack of vigilance Extinction of marines species	Illegal Hunting Deforestation Mangrove reduction and fragmentation	Illegal hunting Deforestation Uncontrolled burns	Illegal hunting Deforestation Uncontrolled burns Human/ Chimpanzee conflict
Finance	IUCN CBMP GEF EU WB	WWF IUCN CBMP GEF EU WB	ONG Tiniguena FIBA	IUCN CBMP GEF EU WB	IUCN CBMP GEF EU WB ICN/ICNF	IUCN CBMP GEF EU WB AD

Recently, Guinea-Bissau has signed several international agreements in order to preserve the country's natural heritage: Convention on the Conservation of Migratory Species of Wildlife (CMS) and the associated treaty called *African-Eurasian Waterbird Agreement* (AEWA), Convention to Prevent Desertification (CPD), Convention on Climate Change and

Oceans Law (COL), Convention on Biological Diversity (CBD), Convention on International Trade of Endangered Species (CITES – not yet ratified: see Casanova & Sousa, 2007) and the RAMSAR Convention (Cassamá, 2006; Dodman, Barlow, Sá, & Robertson, 2004; IBAP, 2007; Johannesburg, 2002).

A grant of US$950,000 for the implementation of a medium-sized project (MSP), the Guinea-Bissau Biodiversity Conservation Trust Fund Project, was approved by the GEF in July 2010 and the World Bank is the implementing agency of this project. This project aims to support the final steps necessary to secure tax exempt status for the Bio-Guinea Foundation (FBG). Until the FBG is fully capitalized, IBAP and the Park system will remain wholly dependent on external project-based funding sources which could jeopardize IBAP and the country's conservation activities to a halt, reversing the gains of the last five to ten years and preventing them from fully capitalizing the FBG (World Bank, 2011).

The majority of the Guinea-Bissau population is highly dependent on resource extraction, such as fish and shellfish, palm tree (see Table of the Species named in this Thesis) products, firewood and coal, straw and African fan palm to build houses, medicinal plants, fruits and many other wild products. Rapid technological development, population growth and human migration are factors responsible for the pressure on natural resources. Guinea-Bissau has higher resource exploitation and degradation rates than neighboring countries. Although the populations of these same countries sometimes *invade* Guinea-Bissau for their resources, the biggest threats are mainly internal (IBAP, 2007).

Environmental degradation in the tropics can be a consequence of population growth, since small farmers do not have access to many technologies alternatives, or ways of production, credit or employment opportunities other than agriculture. All of these aspects increase the pressure on resources in areas with high population concentrations (Temudo, 2009). Some of the biggest threats to natural resources are particularly as follows: forest destruction (slash and burn to cultivate rain-fed rice, or for other crops), wood exploitation, dramatic and unregulated increase in cashew plantations, uncontrolled burns, hunting of all types of animals (medium, large) during all seasons for trade (bushmeat market - see Casanova & Sousa, 2007; Ferreira da Silva, 2012; Starin, 2010) and rapid population growth, with the population size doubling approximately every 25 years. With such current trends, within a few years there will not be even an inch of primary forest in the country (IBAP,

2007). Charismatic species such as chimpanzees, elephants, sawfish or some sea turtles are in great danger of extinction. Other species are also the target of severe heavy hunting: that is the case of baboons (see Table of the Species named in this Thesis) populations, which have undergone a drastic reduction. Fishing and other extractive activities are also at risk of not being able to ensure food security to the poorest communities. Climate change and soil depletion also affect productivity in the agriculture sector, threatening even more the situation of the poorest people (IBAP, 2007).

2.2 Study Site: Lagoas de Cufada Natural Park

LCNP (11°43'N; 15°20'W) is located in the eastern region of Quínara, south region of Guinea-Bissau, which covers the sectors of Buba and Fulacunda, the two principal conglomerations in the area. The Park covers an area of 89.000 ha (including water areas) with 3534 people distributed within 33 principal rural villages (IBAP, 2007; UNDP Project Development, 2009). The predominant ethnic groups are (Figure 2.3):

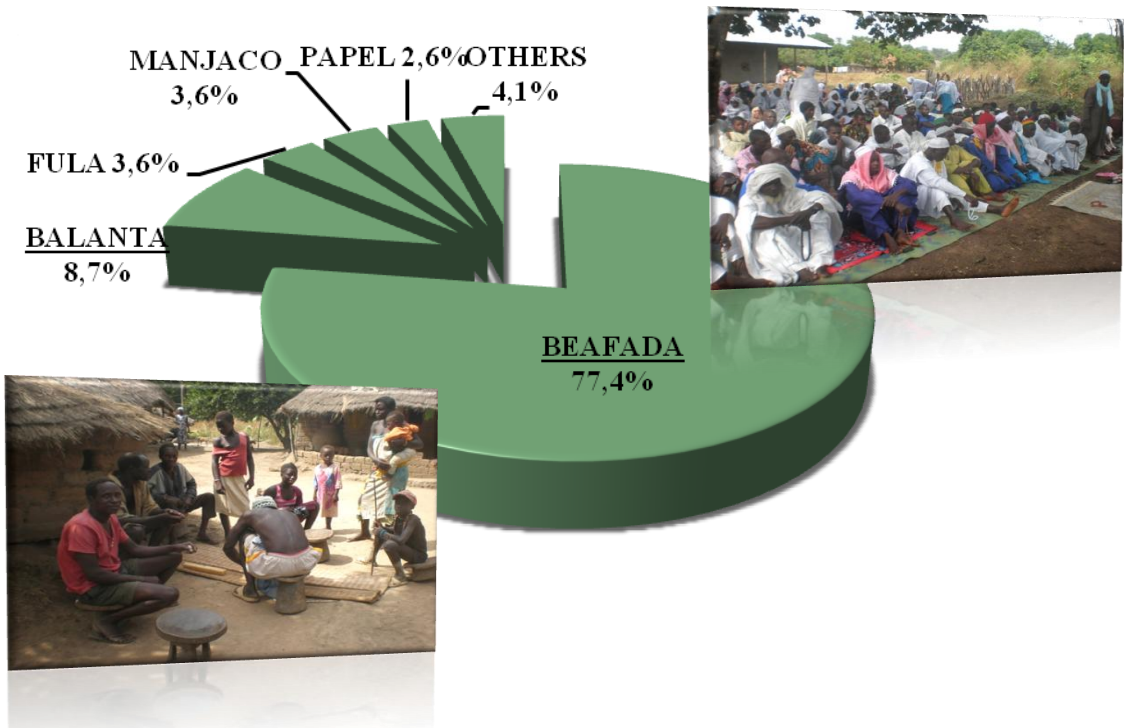


Figure 2.3: Ethnic distribution inside the LCNP (Imbali, 1997).

LCNP was created in December 2000 (IBAP, 2007; UNDP Project Document, 2009; see Table 2.3) by the Guinea-Bissau government and by the Portuguese State (with the participation of the European Union). The Park is bounded at north by the Corubal River, at

east by the Quebo-Buba road, at South by the Grande de Buba River and at west by the Fulacunda River (Imbali, 1997; Robertson, 2001; see Figure 2.4).

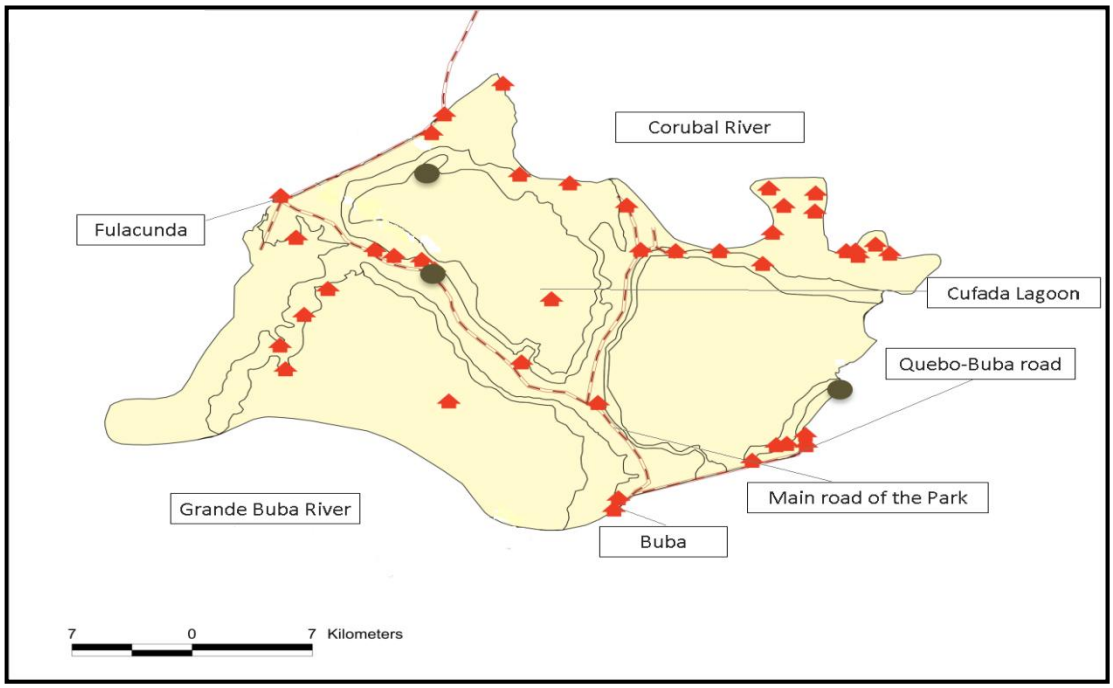


Figure 2.4: Map of the Lagoas the Cufada Natural Park. Main points are indicated and red symbols represent the 33 principal villages and other secondary ones (Adapted map from INEP).

Climate in LCNP is classified as tropical with a clear wet season (from June to October) and a dry season (from December to April). May and November are transition months. May, although considered a transitional month, should be considered as dry, as it is located at the end of the dry season and is one of the hottest months of the year (Imbali, 1997). On the other hand, November, located immediately after the wet season and with an amount of rainfall greater than May, should be considered as a wet month (Imbali, 1997; Robertson, 2001). From the geomorphological point of view, LCNP region is characterized by low elevation plains, influenced by the seas. Low plains particularly characterize the south, west and northwest. At north, east and northeast mid-elevation plains are located. Beside the rivers (Fulacunda, Buba and Corubal) that limit and cross the Park, the territory also comprises three important lagoons: Cufada (the major one at 200 - 600 ha), Bionra (13 ha) and Bedasse (8 ha). These three lagoons represent Guinea-Bissau's biggest reserve of fresh water, as well as a good reservoir (during wet season) and water distributor [during the dry season (Catarino, 2002; Imbali, 1997)]. Among the ecological services provided by the Park, the Cufada lagoon constitutes an important source of fish for population living in this area. During the dry season, it is possible to see more than 1500 white pelicans, which fly from

Mauritania and Senegal to the lagoon, representing a concentration of global significance, and decisive to the classification of this area as a RAMSAR site [international convention on wetlands (UNDP, 1997)].

LCNP is covered by forests (including sub-humid Guinean forest) and savannah woodland, interspersed with some *lalas* (fresh water areas sometimes with high grass). In the Park it is possible to observe a dozen species of ungulates, leopards, hyenas and species of primates, among which are the Western chimpanzee, several colobus species, baboons, green monkeys, among other primates (IBAP, 2007; see Table of the Species named in this Thesis).

Populations living inside the Park mainly rely on agriculture to feed their families and as their main source of income. Hunting and fishing provide the main livelihood sources of animal protein in this area, where domestic animal breeding has a very low expression. The harvest of natural products (oil, honey, charcoal, wood and other items) it is also important for the resident populations (see Chapter 4 for more detail information).

LCNP faces enormous challenges regarding conservation of its remarkable biodiversity. The existence of two cities in the Park boundaries - Buba and Fulacunda - and also a major road that crosses it places severe pressure on the Park territory and its non-human populations. People belonging to these two cities regularly come into the Park area, either to grow crops (food and *cash crops* such as cashew tree plantations) or to hunt. Regarding biodiversity conservation, LCNP has enormous difficulties such as: 1) deforestation and fires in order to prepare the agricultural fields (particularly rain-fed rice); 2) hunting bushmeat for trade, conducted by people who live inside the Park and by people from outside who sell the bushmeat in big cities (Bissau, Quebo and other cities – see Casanova & Sousa, 2007; Starin, 2010); 3) over-fishing at Cufada lagoons and Grande de Buba River; 4) exploitation of non-timber forest products (NTFP) and timber extraction [particularly palm trees, African fan palm, Kapok trees called *poilão* in Guinea-Bissau, among other majestic trees (see Table of the Species named in this Thesis)]; and, 5) growing of cashew plantations which have negative environmental impacts (IBAP, 2007).

LCNP has an operational Management Council, although there are only provisional regulations used by the people who protected this area including the seven guards who work there. The provisional regulation still needs a legal revision to be conducted by the officer

who is in charge of the approval and regulation of all legislation regarding Guinea-Bissau protected areas. According to information collected in the field, 2012/13 may be the transitional years where the Park Regulation will be approved. Meanwhile, Park´s directors and employees regulate their actions by legal instruments such as: 1) Forestry Law, which was created to grant licenses to the natural resource users (the opposite of a Park regulation which has as major goal to prohibit or to limit the access to resources by the users - however there are common points between them since both dictate that is forbidden to hunt during the wet season); 2) Law of Protected Areas Framework, which recommends that the population activities within the Parks to be regulated internally; and, 3) Fishing Regulation, which is very inefficient, because although there are some controls, there is an excess use of gill nets which have an enormous impact on the capture of other animals beside fish, such as manatees; thus, it is necessary to regulate fishing activities in the Cufada lagoon and in the Grande de Buba River.

2.3 Anthropological context

2.3.1 Ethnic Group Origins

The ethnic groups who live on the Guinea-Bissau coast were in the past, during the XIIIth and XIVth centuries, victims of rejection from the ethnic groups of *Mândé* origin who lived in the interior. Even today it is possible to distinguish different social habits between ethnic groups from the coast and the east (Lopes, 1982). The coast, densely forested, dominated by mangroves, palm trees and wetlands, is the territory of most animist ethnic groups as the Balanta, Manjaco and Pepel and recently converted Muslim ethnic groups such as the Nalú and Sosso (Lopes, 1982; Nóbrega, 2003). The Balanta ethnic group is considered the most numerous of Guinea-Bissau with, according to the 1991 census, 254,922 individuals or about 26% of the total population (Nóbrega, 2003).

The Beafada are situated mainly in the south near the coast, in Quínara and Tombali regions. Beafada are considered the "owners of the ground" (*dono di tchon*) in Quínara, and according to oral tradition, the Beafada who currently live in the Park area came from the East, in an attempt to escape from Fula/Fulbe (another ethnic group) domination (Imbali, 1997). Beafada used to be animists, but they experienced an intense process of Muslim conversion after being defeated by the Fula/Fulbe. However, the process of cultural change proves to be slow, since the elements of the old beliefs and values system tend to persist in time beyond the acceptance of the new cultural model. The Beafada, whose Muslim

conversion is not recent, did not abandon all the old/more traditional beliefs and rituals, since it is common to observe their worship of *Alá* together with the evocation and invocation of the ancestors spirits and geniuses [religious syncretism (Carreira, 1961) – see Casanova, 2008; Imbali, 1997].

It is possible that the Beafada and Balanta have a *family* bond. This bond could have its explanation in the escape process of the Beafada to the Guinea-Bissau coast, because when Beafada people reached the Corubal River, one group crossed the Geba estuary and the other remained on the other side under the influence of the Mandinga ethnic group. Thus, separated by this broad estuary, they both evolved separately and produced different forms of organization (Nóbrega, 2003).

2.3.2 Language and other cultural elements

In Guinea-Bissau, Creole is widely spoken in the territory and only a few people speak Portuguese fluently and correctly. Nowadays though, there are people living in rural areas that only speak their ethnic dialect (Casanova, 2008; Forrest, 2003). Both ethnic groups, Beafada and Balanta, have their own ethnic dialects. Although everyone speaks their ethnic dialect, many also speak Creole (many more than Portuguese, probably due to the fact that even teachers do not speak Portuguese correctly and between friends and family only Creole or ethnic dialects are spoken).

Amongst the different ethnic groups in Guinea-Bissau, Balanta build the most dispersed and independent households (Hawthorne, 2001). In Guinea-Bissau the basic settlement unit is called *morança*, which is related to the place where the family members live and it can be constituted by one or more houses. This dispersion is mainly a result of the demands of their rice cropping processes since Balanta are the ethnic group that grows the most paddy rice (*bolanha* rice). The work around the paddy rice is huge, so following the cycle of rain: (1) the rice is sowed near the household in a nursery; (2) meanwhile, *bolanhas* crop fields are prepared near mangroves and wetlands; (3) transplantation of the nursery rice into the *bolanhas* crop fields; and, (4) by the end of December the rice is ready to be collected and its preparation last until March. Paddy rice growing causes dispersed households because it requires a big proximity by the farmer, so families distribute themselves by the wetlands available (Nóbrega, 2003). Balanta settlement occurs primarily in areas that have ecological characteristics likely to perpetuate this way of life. Their social, economic and political

organization is dominated by the imperative of rice production. This production system works through mutual help where women's role is determinant (Imbali, 1997).

In the nineteenth century, Balanta territories were the most densely populated in Guinea-Bissau, however these territories were part of the 'slaving frontier' where intense famine took place, so Balanta began a long process of refashioning their social structures and agricultural practices to meet the challenges of a new era. Balanta retreated to isolated areas near mangrove swamps, where they established defensive villages or *tabancas*. Oral narratives provide evidence that in the era of the Atlantic slave trade Balanta began to concentrate into defensive units on these isolated lowlands that favored paddy-rice production (Hawthorne, 2001). Coastal residents, and particularly Balanta, demanded iron because it strengthened their farming implements and facilitated the clearing of mangrove areas for paddy-rice production. Increased access to iron was only one of the reasons that Balanta gradually turned to paddy rice as their principal crop. There were other factors: 1) paddy rice yields are more nutritious than are yams and sustain dense populations; 2) rice can be stored easily without fear of spoilage; 3) rice became a lucrative trade item, and it would continue to be one in the nineteenth and twentieth centuries; and, 4) rice adapted well to different terrains and soils.

Before Portuguese colonization, Beafada political organization was very similar to the Balanta one. Portuguese colonial power imposed the creation of elder chiefs in the Beafada community. The Beafada tried to resist to this change but after the threat of Fula/Fulbe domination, the change was incorporated. Thus, it is not surprising that the Beafada chiefs do not feel this title as having an important status probably due to the lack of tradition (Hawthorne, 2001). The Beafada produce mainly upland rice (rain-fed rice or *mpampam*) as well as corn, peanuts, beans and cassava (Imbali, 1997; Temudo, 2009). Both ethnic groups plant near their households' fruit trees particularly mangos, oranges, tangerines and others (Carreira, 1961). They now also both depend on cashew plantations as an important source of income [*cash crops* (IBAP, 2007)].

2.3.3 Social Structures

Rural Guinean populations tend to organize their own ethnic group by age. An individual (male) is considered as an integral unit of the family and the group itself when he passes through all of the different age-grades. In Muslim groups these are termed *hierarchical*

hereditary transmission of occupation, while among the animists *age-grades* [it divided village males into two main bodies: elders or *b'alante b'ndang* and youths or *blufos*, females had a parallel age-grade system (Hawthorne, 2001)]. The *hierarchical hereditary transmission of occupation* is similar to the Indian *caste-like system*, but not as exclusive and rigid as in India (Carreira, 1961).

As previously mentioned, Befadas used to be animists[1]. Over the years, they were exposed to a Muslim conversion and assimilation process. So, presently they perceived themselves as Muslim, although some Beafadas continue to drink alcohol and to practice the *Irã* cult, which is an animist practice (Imbali, 1997). Balanta people are mainly animists (Nóbrega, 2003; Temudo, 2009). But there are common traits in both groups, Beafada (Muslins) and Balanta (Animists): both men and women of both ethnic groups acquire adulthood at similar stages of age; they both make distinction between adulthood and full access to rights and obligations in the case of men. However, the stages and rituals are extremely different between these two groups (Carreira, 1961).

In Muslim groups, both men and women acquire adulthood through two different stages. In the first stage, they only have some simple initiation testimonies. In the second stage, they have the most important ceremony which is called *Fanado* and consists of circumcision for men (between ages of 7 and 15 years) and excision (partial or total) of the clitoris for women at the same age. After this procedure, both men and women must remain in the bush for physical resistance proves, 3 months to one year for men and weeks for women (Carreira, 1961; Imbali, 1997). In the Balanta ethnic group, one child (male only) with more than six years reaches a certain stage of age where the *ainés* (children from an older age-stage) will be responsible for his social education. This communitarian form of education will be complemented by the education given by his family until the age of 10-12 years. After this age-stage, education will be provided by the community, particularly by the *age-grades* system until the age of the *Fanado* ritual. Described as a higher status attribution than the traditional education, *Fanado* takes place in adult men with about 35 years or more. After this ritual, men are considered able to assume all social responsibilities including starting a family (Imbali, 1997).

[1] This is the term that is used by the people themselves "animista". They recognize a diverse pantheon.

2.3.4 Gender differences

The working tasks performed by Guinean women that contribute to economic activities are very important to social progress and family unit equilibrium. Their role is extremely important in areas such as: production of services (especially farming) in both urban and rural sectors, education of children, providing help for ill family members and carrying out domestic work (DENARP II, 2011).

Disparities and lack of opportunities for women are seen in all areas and sectors of the country. Paradoxically, although having an important role in all civil areas, women suffer more than men from fewer opportunities in health, education and learning new skills. Women continue to have limited access to information because of their poor level of literacy and income, but also due to the marked gender roles and expectations in most African territories, where women are considered second-class citizens being always below men in the social hierarchical order (DENARP II, 2011). In fact when looking at most African social structures, women and children are almost unperceived or elusive. There are cultural reasons for this, but it is certainly negligent to exclude the voice of women and children from research whose aim is to understand the acquisition of culture (Esterhuyse, 2005) or other studies that have as their goal the study African societies.

Depending on the ethnic group and the family status, some girls are likely to be forced to marry with men chosen by their families and who they may not know. Many of these men are much older than the girls who are forced to marry them, sometimes before puberty (Casanova, personal observation, 2007; UNDP, 2006). Any reduction of gender disparity necessarily implies action on this structural inequality (DENARP II, 2011).

2.4 Agricultural activities and their impact on protected area and its species

2.4.1 Farming

Rice farming is the main activity of the Guinea-Bissau population. Rice crops are destined for household consumption and as a major source of income. As previously mentioned there are two main types of rice processes: dry or rain-fed rice and wet/paddy rice. Rain-fed cropping is mainly practiced by the Beafada. Rain-fed rice implies forest clearing (via slash and burn technique). Forest clearing creates major difficulties for biodiversity conservation in the LCNP and other parks and protected areas in the country (Casanova & Sousa, 2007). On the other hand, wet or paddy rice is mainly cultivated by the Balanta. This

type of rice is cultivated near the mangroves and in low and wet lands (*lálas*), so no deforestation takes place. It is a more conservation friendly-agricultural technique, at least in the absence of application of high-nitrogen fertilizer, the use of pesticides, or the absence of deforestation.

According to IBAP (2007 – and see also Casanova & Sousa, 2007) the main problem inside LCNP is the deforestation and burning of the forest linked to agricultural activities. Such activities are carried out by individuals from Buba and Fulacunda cities and by the local residents with destructive impacts on the forest and its wildlife. The alternative to the *mpampam* rice process is the *bolanha* (paddy rice). However not every village inside the Park is located near bas-fond areas (wet and low lands) where it is possible to grow such rice crops. Also, due to the rising of the sea level, some populations are already seeing their paddy rice production destroyed (Casanova & Sousa, 2007).

2.4.2 Hunting

Hunting is a men's activity for household meat consumption and for the bushmeat trade (trade performed by both men and women) inside and outside the Park. Beafada do not eat pork or non-human primates due to their religion (Muslim), while the Balanta do not have such restrictions. Usually, people do not eat domestic livestock animals. Balanta are not culturally "professional" hunters (e.g. hunting for trade) as Beafada men are (for more detail information see Chapters 5 and 6).

LCNP has hunting rules and biodiversity conservation actions near the local communities do take place. Guards sometimes confiscate weapons, mainly during the wet season (when it is forbidden to hunt). Families living inside the Park are allowed to hunt animals for personal consumption only. It is illegal to hunt for trade, especially animals that are larger than gazelles. Non-human primates, chimpanzee included, are also illegal to hunt. According to IBAP (2007), it is essential to adopt clear regulations prohibiting the transport of weapons by non-residents, as well as control mechanisms that prevent the bushmeat trade (locals included). The large road that crosses the LCNP allows hunters and others easy access to all Park areas to hunt restricted animals to satisfy urban consumers. Primates are a major target in the bushmeat trade: baboons, green monkeys and other are hunted even during the night (Casanova & Sousa, 2007).

2.4.3 Fishing

Both men and women fish for household consumption and for trade in local markets inside the Park. While Balanta men usually fish with nets in rivers and in the sea, women fish in river bottoms with circular nets and also harvest shellfish. Befada men also fish with nets in rivers and in the sea, but Beafada women only harvest shellfish.

According to IBAP (2007), over-fishing is a problem that affects the Park, both in the freshwater lagoons (e.g. Cufada lagoon) and in Grande de Buba River. Although there are some controls, there is an excess use of gill nets which have an enormous impact on the capture of other animals beside fish, such as manatees. Thus it is necessary to regulate fishing activities in the Cufada lagoon and in the Grande de Buba River.

2.4.4 Non-timber forest products (NTFP) and timber extraction

Communities inside the Park produce and sell products such as honey. Such production has the support of the Park authorities since it is seen as a sustainable activity, avoiding those other activities that are connected with deforestation. People living inside the Park also produce both palm and cashew wine to sell. Alcoholic drinks are mainly sold by the Beafada (Muslins). Palm trees are also used to produce red cooking oil (for household consumption and for sale) and black soap [also for household consumption and sale (for more details see Chapter 6)].

Timber extraction also affects the Park and although this problem has been controlled with some success in recent years, the pressure remains, particularly through the River Park access which allows for the illegal extraction of palm trees and African fan palms (IBAP, 2007). The wood from African fan palms is especially used in house construction. Inside LCNP, locals use these trees, but only relatively small quantities per year. The proliferation of cashew plantations along the road that connects Buba-Fulacunda (and crosses the Park), is still a relatively minor problem, but the expansion of these areas needs to be carefully controlled and monitored (IBAP, 2007). Casanova and Sousa (2007) describe new cashew field areas being developed inside the Park every year. Cashew is the major exportation product in Guinea-Bissau: 1.200 tons in 1970, 100.000 tons in 2005, 135.500 tons in 2009 and 122.300 tons in 2010 (English, 2010), and the control of these plantations could impact on local incomes.

2.5 Summary

Behaviour is at least partially driven by attitudes, beliefs, and normative standards (Aiken, 2002; Ajzen & Fishbein, 2005; Fishbein & Azjen, 1974). Fazio and Petty (2008) characterize attitudes as brief trials of an object or event that helps individuals structure their complex social environments. Different social conditions of life delimit and initiate different types of life experiences, and this contributes, therefore, to individuals making assessments and producing guidelines that justify the relationship that they develop with their social world (Casanova, 2004; Gleitman, 2002; Smith & Mackie, 2007; Vala & Monteiro, 2002; Yzerbyt & Leyens, 2004).

Following the premise that only the knowledge of a reality allows for its conservation, understanding the political, economic and development context of Guinea-Bissau, will allow for a better understanding of the attribution of meanings and attitude measurements that local ethnic groups (Beafada and Balanta) build around nature and biodiversity (Casanova & Sousa, 2007). Thus, such knowledge can be transformed in a relevant biodiversity conservation tool, because social perceptions and attitudes are important to a full understanding of the basis of conservation programmes (Adam & Infield, 2003; Lee & Priston, 2005).

Chapter 3

Methods

3.1 Overview of methods

This research combines both quantitative and qualitative methodology, combinations which are becoming more common in Anthropology and other social sciences (see Barnard, 2000; Kottak, 2004; Rapport & Overing, 2000; Sampieri, Collado, & Lucio, 2006). This combination increases confidence in the results presented, enhancing the comprehensiveness of the study by using complementary questions within a single study (Arksey & Knight, 1999). Using multiple methods is one way to strengthen a study, for instance the use of: focus-groups, supplementary open-ended questions, or the development of fictional vignettes all together in one study (Brownez-Nuñez & Jonker, 2008).

Usually a complete process of inquiry must begin with a qualitative phase, in the form of a set of semi-structured interviews followed by a quantitative phase (Ghiglione & Matalon, 2001). However, sometimes, in contrast with the usual order, after applying a quantitative technique, one qualitative phase can be a very useful complement, which was the case in the present research. In order to achieve a comprehensive and robust understanding that will contribute to more effective conservation measures, it is particularly important for attitudes studies to address mixed methodologies (Brownez-Nuñez & Jonker, 2008).

Many studies on protected areas attitudes and awareness cross-classify questions that address specific household level variables (natural resource use, crop damage, types of crop fields, ethnic or religious group, education level, household's wealth) to determine which socio-demographic factors are more relevant in determining conservation attitudes and awareness (Durrant & Durrant, 2008; Fu et al., 2004; Xu, Chen, Yihe, & Fu, 2006). Numerous studies have shown that all these socio-demographic factors are important, but education as well as economic costs or benefits to households are frequently most salient (Heinen, 2010). Other studies have shown that disparities in resources use, perceptions and conservation attitudes can all vary greatly between long-term and more recent residents around protected areas worldwide (Nyhus, Sumianto, & Tilson, 2003; Sah & Heinen, 2001). Generally, conservation programs become more difficult to implement as populations increase and diversify (Heinen, 1996). This factor contributed to the choice of studying the two most representative ethnic groups living within the LCNP, the Beafada and the Balanta. Using two groups not only improved the knowledge about the population living inside the LCNP, but also allowed for comparison between two different cultures and life stories as well as the

understanding of how these cultural differences could be related with attitudes regarding LCNP conservation. Protected areas are often still established in developing countries without a priori knowledge or participation from local communities and, in too many places, local communities become marginalized (Heinen, 2010). Thus I focused on understanding the attitudes towards LCNP on the part of these two communities.

3.2 Study Period

Data collection used four different methodological techniques consisting of (a) questionnaire interviews (survey); (b) in-depth interviews; (c) focus-groups; and, (d) non-participant observation. The study period was divided in four distinctive stages, with a pre-test questionnaire conducted prior to main data collection. Data collection was carried out in three different periods of time: from October 2009 to December 2009, from February 2010 to April 2010 and from November 2011 to December 2011 (6 months total). These periods were chosen in order to avoid the wet season (between May and November) when roads become impassable, compromising visits to certain villages. Over these three periods, I recorded 803 hours of observation and data collection (see Table 3.1).

Table 3.1 – Details on the time spend with data collection.

Technique	Period of Time	Sample Size	Hours of Data Collection
Questionnaire interviews (survey)	October to December 2009 (8 weeks)	N= 258	334 Hours
	November to December 2011 (7 weeks)	N= 60	222 Hours
In-depth interviews	February to March 2010 (6 weeks)	N= 47	186 Hours
Focus-groups	March to April 2010 (2 weeks)	N= 6	61 Hours
Non-participant observation	October 2009 to December 2011 (23 weeks)	-	803 Hours

3.3 Generality versus Specificity

Any empirical research presupposes a data collection period, where information in the form of observations, or measures of values corresponding to one or more variables, is normally supplied by a number of entities or individuals (Hill & Hill, 2002). The domain for this research was constituted by the population of the administrative region of Quínara living in the LCNP. According to the recent census available, the Park had 3534 people distributed within 33 principal rural villages (IBAP, 2007; UNDP Project Development, 2009). However, these are not necessarily reliable demographic data as the census usually does not take into account people's movements within or between areas.

In the majority of studies, there are time constraints or economic limitations (among others). Thus, the choice of a sample within the region was crucial to obtaining adequate respondents within a reasonable time, as well as to be able to generalise to the larger population (Hill & Hill, 2002; Quivy & Campenhoudt, 1998; Sampieri et al., 2006). The sample for this research consisted of individuals belonging to the two most representative ethnic groups: the Beafada and the Balanta, as noted above. The Beafada community is the more common ethnic group present in the Park (77.4%), followed by the Balanta [8.7% (Imbali, 1997)].

In order to generalize or extrapolate the data from this thesis to the whole population of both ethnic groups within the LCNP, it would have been necessary for the sample to be randomly chosen (Ghiglione & Matalon, 2001; Sampieri et al., 2006). Thus, all the individuals that reside in the region should have the same probability of being selected in the sample. Given the lack of reliable demographic data, the sample of this study was necessarily non-random (Quivy & Campenhoudt, 1998; Sampieri et al., 2006). Still, I tried to keep age and gender as balanced as possible by introducing artificial quotas (Quivy & Campenhoudt, 1998; Sampieri et al., 2006; Vicente, Reis, & Ferrão, 2001). Although quota samples aim to represent the proportions of the population across different strata, and since censuses were not reliable, I chose individuals belonging to all different age-intervals and genders. Thus, the samples used throughout this thesis were not a *traditional* quota sample due to constraints regarding census feasibility. Given the unavailability of reliable demographic data, and the non-random sample (Quivy & Campenhoudt, 1998; Sampieri et al., 2006) extrapolation of the data to all populations living inside LCNP should be viewed with extreme caution. These data

should be interpreted as representing the individuals interviewed, and generality will be assessed by comparing responses with existing or previous studies.

The age-groups chosen for the study were: 14-19; 20-39 and 40 years old or more. The wide intervals between age-groups were adopted because many respondents did not know their exact age. Most knew only that they had been born in the dry or wet season. Gender and age were important variables to consider since opinions and perceptions of nature and conservation may vary across these (and other) variables (Eriksen, 2001; Gillingham & Lee, 1999; Kaltenborn et al., 2006; Nanda & Warms, 2004).

In the first stage of the present research, a survey questionnaire (N=258) was administered (from October 2009 to December 2009) where individuals of both ethnic groups (Beafada and Balanta) and gender were interviewed. Questionnaires were not self-administered since most of our respondents were illiterate. They were all conducted by the interviewer. During the second field-work stage, in-depth interviews only applied to men (N=47) and 6 focus-groups only applied to women (N=62) were conducted from February 2010 to April 2010. In the last field-work stage, from November 2011 to December 2011, a new survey questionnaire (N=60) was applied also to both ethnic groups and genders for assessing local knowledge and attitudes towards conservation regarding specific flora and fauna species. Non-participant observation technique was also used when the other techniques were being applied and during observation periods that occurred almost every day while in the field.

The study took place under the consent of the Republic of Guinea-Bissau government (via IBAP) and local authorities (village elders/chiefs). Every time I arrived in a new village I first asked permission of the village chief to conduct the study explaining to him the aim of my work and how I was going to proceed, if authorized. After obtaining his consent I also asked for permission from all interviewees.

In Guinea-Bissau, Creole is spoken in many parts of the territory and only few people speak Portuguese. However, in more isolated villages people only speak their local ethnic dialect (Beafada or Balanta). In order to overcome this constraint, I was accompanied by two local interpreters (one male and one female) living within the LCNP territory. This ensured that both interpreters came from the same cultural background of the respondents. The woman

interpreter allowed me, in the second field-work session, to overcome the difficulties inherent to the participants in the focus-groups (Barbour & Kitzinger, 2001). All interpreters were trained (e.g. the goal and meaning of each concept and question were discussed along with how questions should be performed) and procedures were explained before conducting the study. Each concept, idea and question (from survey, in-depth questionnaires and focus-groups techniques) was previously discussed with the interpreters to make sure of their total agreement regarding the information asked. Since the survey questionnaires and the in-depth interviews were administered in Creole, each question was back-translated. More details on the questions and items explored during each stage of data collection will be given in the respective Chapters. Questionnaires and in-depth interviews scripts are presented in the Appendices.

3.4 Data collection

3.4.1 Survey

Survey questionnaires are one of the best quantitative techniques for the collection of a large amount of diverse information in a systematic and organized way (Ghiglione & Matalon, 2001; Hill & Hill, 2002; Quivy & Campenhoudt, 1998; Sampieri et al., 2006). The use of a quantitative survey technique was necessary in order to collect a wide range of information related to the behaviours and habits (discourses and practices) of each individual (Ghiglione & Matalon, 2001). The questionnaires were mainly composed of closed questions although there were also open questions that were subsequently coded (Sampieri et al., 2006). While the closed questions presupposed a concrete choice within options previously presented, the open ones allowed total freedom to the respondent, revealing an inexhaustible source of information (Carmo & Ferreira, 1998; Foddy, 1993; Ghiglione & Matalon, 2001; Hill & Hill, 2002; Quivy & Campenhoudt, 1998; Sampieri et al., 2006).

Survey questionnaires allow researchers to reach many individuals in a systematic way and are used to understand phenomena such as attitudes, opinions, preferences, representations, which are only accessible through language and rarely spontaneously expressed (Carmo & Ferreira, 1998; Foddy, 1993; Ghiglione & Matalon, 2001; Hill & Hill, 2002; Quivy & Campenhoudt, 1998; Sampieri et al., 2006).

My survey questionnaires aimed to collect information regarding different aspects of the individual's livelihoods inside the Park such as: i) economical information: to be

acquainted with the main sources of income of each ethnic group; ii) religious beliefs: to be aware of their rituals and beliefs; iii) socio-zoological scales: to evaluate the perceptions and attitudes of both ethnic groups to a wide range of animals (wild and domestic ones) all of which were found inside the LCNP; iv) hunting and dietary habits: to get to know their hunting practices, their diets and the connection between the two in both ethnic groups; and, v) expectations regarding a tourism-"industry" scenario inside the Park: to evaluate their potential reception towards foreign peoples in their villages (see Appendix 1). I visited 30 villages inside the Park (N=15 Beafada and N=15 Balanta). These 30 villages were selected to take into account different factors, such as: i) villages must belong to the ethnic groups Beafada and/or Balanta; ii) villages must not be repeated if possible during the use of each of the different study techniques; and, iii) villages must be located throughout the main protected areas, thus spread across the LCNP territory [(near the main road that crosses the Park, near Grande Buba River at South, near Corubal River at North, near Cufada Lagoon and at east near Quebo-Buba road) see Figure 2.4 in Chapter 2].

These different areas were relevant because villagers have different disadvantages and advantages due to living in one area and not in another inside the Park, for instance: villagers living near the main road have greater access to Buba and Fulacunda cities; villagers living near Corubal River have easy access, by canoe, to the city of Tite; villagers living near Cufada lagoon usually have a higher dependency on fishing activities as a main source of income; villagers living in more isolated villages, such as Saninja, Samienté, Uanaporto and others have a more difficult access to transportation or health care.

During the application of survey questionnaires, in-depth interviews and focus-groups I used photographs of both wild and domestic local animals [N=26 (Appendix 6)] to make sure that both interviewer and respondents were referring to the same animals. Furthermore, I also wanted to test if both wild and domestic animals were perceived differently. First I tested people to see if they knew or recognized all the animals shown. In order to establish a *preference ranking* of people's wildlife species preferences I adapted the sociozoologic scale structure developed by Arluke and Sanders (1996) and applied by Costa (2010) during Guinea-Bissau field-work. This method was chosen, rather than a pile sort technique (e.g. Hines & Eckman, 1993) as comparative data were available for other protected areas in Guinea-Bissau and this technique clearly addressed issues of cultural salience (e.g. Thompson & Zhang, 2006) while distinguishing between positive and negative salience.

Species were categorized by the researcher into livestock, primates and other wild animals (birds, fishes, reptiles, insects and mammals). Subsequently, people were asked to assign 11 traits or attributes which were: *good*, *bad*, *pretty*, *ugly*, *smart*, *less smart*, *edible*, *not edible*, *frequently seen*, *infrequently seen* and *similar to humans*, to these animals. These adjectives were chosen in an attempt to understand basic biophilic values of nature (Kellert, 2009). The concept of *biophilia* can be defined, according to Kellert (2009, p. 26) as "a complex of weak biological tendencies to value nature that includes material, aesthetic, emotional, intellectual, spiritual, and other basic dependencies on the natural world that contribute to human physical and mental well-being" (for more detailed information see Chapter 1).

Table 3.2 – Typology of Biophilic Values of Nature (Kellert, 2009) and respective traits associate.

Value	***Definition***	***Function***	***Traits***
Aesthetic	Physical attraction and appeal of nature	Harmony, security, creativity	*Pretty/Ugly*
Dominionistic	Mastery and control over nature	Physical prowess, self-confidence, mastery skills	-
Humanistic	Emotional bonding with nature	Bonding, cooperation, companionship	*Similar to humans*
Naturalistic	Exploration and discovery of nature	Order, meaning, connection	*Smart/Less smart*
Moralistic	Moral and spiritual relation to nature	Curiosity, exploration, discovery	*Good/Bad*
Negativistic	Fear and aversion to nature	Safety, protection, awe	*Good/Bad*
Scientific	Systematic and empirical study of nature	Knowledge, understanding, critical thinking skills	*Frequently Seen /Infrequently seen*
Symbolic	Nature in language and expressive thought	Communication, mental development, analytical skills	*Similar to people*
Utilitarian	Material and physical exploration of nature	Physical sustenance, material productivity, survival skills	*Edible/Not edible*

The association between the basic biophilic values of nature (Kellert, 2009) and the 11 traits (see Table 3.2) was necessary due to the constraints of using translators and therefore a level of linguistic sophistication among the respondents that the Portuguese-speaking interviewers found hard to access. People were asked to provide the names of their top three animals for each trait. Wild and domestic species were randomly selected from a set of reported animals for the region. A control photo with an American mammal (capuchin monkey was also used as a reliability mechanism (see Table of the Species named in this Thesis; Appendix 6). The photo order of presentation was randomised and mixed between each presentation.

A questionnaire with a relatively long duration and a vast array of items (compared with the most surveys applied to so called *industrialized* populations), requires a high level of concentration from both interviewer and respondent. However, this was not a constraint because in Guinea-Bissau, as in most African countries, especially in isolated rural settings (where this study was conducted), the concept of *time* as a constraint seems to be different and greater willingness was shown by individuals to participate in research studies.

3.4.1.1 Pre-test

Pre-test is defined as the questionnaire *test* applied to individuals that belong to the studied population, but not to the studied sample (Ghiglione & Matalon, 2001; Hill & Hill, 2002; Lima, 2000). The questionnaire was administered by me as discussed above due to illiteracy. Pre-test applications were important for the detection of flaws in certain questions such as vocabulary accessibility, familiarity with different items, questionnaire construction and respondent's reactions. Unusable questions were removed from the final questionnaire (Ghiglione & Matalon, 2001; Hill & Hill, 2002; Lima, 2000).

3.4.2 In-depth interviews

In-depth interviews have the advantage of collecting more detailed or nuanced information (Quivy & Campenhoudt, 1998; Sampieri et al., 2006) by comparison to the survey questionnaire technique. Thus, in-depth interviews were used to complement the information previously collected through the questionnaires. Interesting and important aspects revealed during the survey were explored in a more profound way.

During in-depth interviews (N=47) I interviewed exclusively individual adult men such as: Park guards (N=7; all Park guards from LCNP), village elders/chiefs (N=3 Beafada and N=5 Balanta), hunters (N=7 Beafada and N=7 Balanta) and farmers (N=10 Beafada and N=8 Balanta) all living inside the LCNP. My goal was to assess the interviewee's perceptions about the Park, specifically regarding the way they interpreted biodiversity conservation, how they used natural resources and to understand their hunting habits and practices. Thus, in detail, the main aim was to explore more information regarding items such as:

(i) Park Guards: understanding of Park guards work, the use of the forest by the locals, local hunting and dietary habits, forest conservation and its perceptions (see Appendix 2).

(ii) Local Men/Farmers: their livelihood perceptions, economical information, forest dependency, hunting and dietary habits and their forest conservation perceptions (see Appendix 3). To collect this information 9 villages inside the Park (N=3 Beafada and N=6 Balanta) were visited.

These 9 villages were selected taking into account three factors noted above: i) villages must belong to the ethnic groups Beafada and/or Balanta; ii) they had to be villages that I had not visited during surveys; and, iii) villages had to be located in the main different areas inside LCNP [near the main road that crosses the Park, near Grande Buba River at South, near Corubal River at North, near Cufada Lagoon and at east near Quebo-Buba road (see section 3.4.1)]. A higher number of Balanta villages were visited because their villages were smaller and with fewer individuals than the Beafada ones.

During the in-depth interviews, data from the Beafada ethnic group were collected first. Interviews were made according to the availability of men (village elders/chiefs, hunters and farmers) present in the selected villages. During the Balanta men data collection, I tried to reproduce the same number of village elders/chiefs, hunters and farmers in order to compare results. Although I also found 7 hunters, since I had visited more Balanta villages I ended interviewing more Balanta village elders/chiefs.

3.4.3 Focus-Groups

Focus-groups are a qualitative technique that consists of joining a certain group of people in order to discuss specific issues (Barbour & Kitzinger, 2001). This technique was different from the individual in-depth interviews due to interactions between the individuals (in focus-groups) which generates discussion and answers related to the issues presented. The technique of focus-groups is ideal for exploring peoples' experiences, desires, opinions and concerns. While survey questionnaires provide a greater amount of systematic information and illustrate consistency in points of view, focus-groups are better at exploring how these points of view are expressed and constructed (Barbour & Kitzinger, 2001).

I conducted 6 focus-groups only with women (N=37 Beafada and N=25 Balanta). Women were difficult to interview, as they were always too busy with their normal daily activities to co-operate with us regarding data collection. Focus-groups allowed interviews to occur at a time and place that suited a number of women. I wanted to understand women's perceptions regarding several issues, ranging from the way they saw their own livelihoods, the Park`s existence, biodiversity conservation and the use of natural resources by women.

Village choice for focus-groups was again based on four criteria: i) villages must belong to the ethnic groups Beafada and/or Balanta; ii) they had to be villages that I had not visited if possible, with the aim of collecting information from a wide range of different villages belonging to these two ethnic groups; iii) villages were selected once again according to the criteria of being located in the main different areas inside LCNP [near the road that crosses the Park, near Buba River at South, near Corubal River at North, near Cufada lagoon and at east near Quebo-Buba road (see section 3.4.1)]. However, for each focus-group (Beafada focus-group and Balanta focus-group) I chose the same location inside LCNP, in order to see if village location inside LCNP influenced both ethnics groups similarly, or on the contrary, had no influence. The first focus-group pairing by ethnicity was located near Corubal River (North), the second near the main road that crosses the entire Park, and the third near Quebo-Buba road (East).

The items used during the in-depth interviews with men were also used as points of discussion during the meetings with women to enable comparisons between genders. However, in the *livelihoods perception* item, I added new items such as: difficulties during pregnancy, problems with infant and children's health (and mother's health) and what kind of

support or services is needed. This was essential to understand women's needs as mothers (see Appendix 4).

3.4.4 Assessing local knowledge

In the last field-work season, both a survey questionnaires (N=60) and the interview technique (N=60) were used to assess local knowledge and attitudes towards conservation held by men (N=15 Beafada and N=15 Balanta) and women (N=15 Beafada and N=15 Balanta) regarding specific animals and plants such as: chimpanzees; gazelles; baboons; cane rats; palm trees and African fan palms. These species, of economic value or which emerged in previous work as representing a cost to people, were presented as photographs (Appendix 7).

Eleven villages (N=5 Beafada and N=6 Balanta) were selected taken into account three factors: i) villages must belong to the ethnic groups Beafada and/or Balanta; ii) had to be villages that I had not visited before with the aim of collecting information from a wide range of different villages belonging to these two ethnic groups; and, iii) villages had to be located in the main different areas inside LCNP [near the main road that crosses the Park, near Grande Buba River (South), near Corubal River (North), near Cufada Lagoon (Centre) and at east near Quebo-Buba road (see section 3.4.1)]. A higher number of Balanta villages (N=6) were visited because each Balanta village is smaller and fewer people live there in comparison with Beafada (N=5).

After initial data analysis I was able to identify which animals were more or less valued by both ethnic groups (Beafada and Balanta). The main goal of this last field-work stage was to evaluate the knowledge as well as conservation attitudes of these two ethnic groups towards animals that they stated during the Biophilic assessment as highly "valued" (were *pretty, smart, good, edible* and *similar to people*) or not valued (particularly due to crop-raiding). I chose four crop-raiding animals (baboons, cane rats, chimpanzees and gazelles) where one, the gazelle, was ranked highly in positive traits, while baboons and cane rats were top-ranked as crop-raiders, and chimpanzees were our species of greatest conservation concern (see rankings of pests in section 6.3.4 in Chapter 6). The plants, while not explored in the value rankings, were known to be of considerable economic value from focus-group discussions.

First, with the use of 6 photographs showing the pictures of the animals and plants, I conducted an open question where people individually (N=60) explained, using their own words and concepts, the animal or plant in the photo and their feeling towards them. The determination of words and feelings towards some animals/plants may increase the success (or failure) of an educational/conservational approach in schools [Barros et al., 2011; Haenn, 1999; Kellert & Wilson, 1993 (see Appendix 5)].

Secondly, I attempted to assess interviewees' general knowledge of those specific animals/plants through seven true/false statements (see Table 6.1 in Chapter 6). The statements used were taken from publications about these species and intended to address biological as well as ecological aspects. This knowledge provided a comparison between the knowledge of the interviewees and the scientific literature so that I could assess their level of knowledge. For these true/false data and those on attitudes (see Table 6.2 in Chapter 6) an SPSS data base was constructed and answers were analysed according to the ethnic group and gender. However, the sample of both men and women within each ethnic group was too small for statistical comparisons within or between groups (N = 15 in each group) and could have been skewed by single individuals who were simply reluctant to display knowledge or a lack of knowledge; as such, results are presented and discussed qualitatively.

Next, nine statements were designed (see Table 6.2 in Chapter 6) to address the attitudes towards the conservation of the animals in this second series of photographs (Appendix 5). For these data an SPSS database was constructed and answers were analysed according to the ethnic group and gender.

3.4.5 Non-participant observation

Observation (non-participant) may be defined as a *look* over a situation without changing it or interfering in the events that are taking place (Quivy & Campenhoudt, 1998; Sampieri et al., 2006). Within the framework of scientific techniques, observation can be defined as *direct* or *indirect* (Deshaies, 1992). Direct observation is carried out when the researcher take notes, for instance, of: facts, gestures, events, behaviours, actions, physical realities, in another words of all the reality that takes place in a particular context (Deshaies, 1992; Quivy & Campenhoudt, 1998; Sampieri et al., 2006). Participant observation and non-participant observation are variants of direct observation (Deshaies, 1992).

In this research non-participant observation was used because I did not participated in local activities such as hunting, farming, or Parks´ vigilance, among other activities performed by studied individuals. However, my observations could be considered as semi-participant (Sampieri et al., 2006) since I lived in a village under the same conditions as the local people: absence of electricity, running water, internet, deep changes on the diet, and contact with new diseases such as malaria, among other pathologies (see Casanova, 2008).

3.4.6 Reflective thought

Working in a different cultural environment is not always easy and requires some form of adaptation. And adaptation also takes some time. I felt that time was needed for me to feel integrated in this specific cultural context. The main constraint in the field was the fact that I am a white European woman with an origin in the colonial power that had been rejected. I did not sense any kind of resentment or negative attitudes towards me; on the contrary, I felt that locals have some admiration towards Europeans. Although this could be a positive aspect, in my opinion it was not, because I could not as easily engage with local people as I wished or be at the same level of understanding as, for example, the Guinean women. As a white Portuguese woman in terms of social stratum I am below the Portuguese or Guinean men but above the Guinean women which sometimes produced constraints among women in talking to me. Also, men feel superior regarding women (black or white).

The use of local Guinean interpreters was one solution to be able to get closer to the people in the villages, a decision that seemed to work well. The male interpreter that I have worked with had been a professional hunter in his recent past. Such a fact helped specially in getting answers regarding delicate issues such as hunting, bushmeat and pet trade (all of which are "illegal" under new country-wide protected areas regulations). The male interpreter was respected by the local people in the Park because he was a very hardworking man. On the other hand, in order to work with women I had to find a female interpreter who could diminish the distance between me and interviewees, making discourse much easier.

3.5 Data analysis

3.5.1 Quantitative analysis

After the first season of field-work, quantitative data from the survey questionnaires were analyzed using SPSS statistics (version 18) and Microsoft Excel 2010. In order to access data related to the economic activities regarding both ethnic groups (Beafada and Balanta) and

gender, I used the items related to the economic information of the villagers from the survey questionnaires (see Appendix 1). This analysis included the calculation of the weighted rank index (WRI) since it is a ranking question. A WRI is calculated to show the mean rank of each response category for the entire survey sample according to the following formula (Gillingham, 1998) modified from Nepal and Weber [1993 (see Chapter 4 for more detail information)]. The WRI was also used to calculate the Weighted Rank Index - Top Five Animals for each trait in order to compare them (see Chapter 6).

Based on questions related to livestock and other material possessions from the survey questionnaires, a simple index (see Chapter 4) for the level of material wellbeing was made from the calculation of a possessions scores for each individual (N=258). Univariate analysis of variance (SPSS V18) was carried out to test for relationships between the household possessions score and four categorical social variables (see Table 4.4 in Chapter 4).

One main goal of quantitative analyses was to distinguish individual's livelihood risks (see Chapter 4 for more details). Risk mapping was an important tool providing access into the main daily livelihood constraints of both ethnic groups (see Chapter 4). A risk map is a tool that prioritizes and maps each risk into four quadrants of significance of threat and likelihood of occurrence (Quinn, Huby, Kiwasila, & Lovett, 2003; Smith, Barrett, & Box, 2000). During in-depth interviews (N=40), men from both ethnic groups were asked to mention the major difficulties of their villages. The same task was performed during the women only focus-groups (N=6) for both ethnic groups. This method allows the subjects to decide what the major risks are rather than being told to choose from a list that may be biased to begin with by the researcher (Smith et al., 2000).

Non-normally distributed or categorical data (e.g. age, religion) were grouped into categories for analysis. The Split File function in SPSS programme allowed me to calculate frequencies and use the Chi-square (χ^2) test for either ethnicity and/or gender.

Limitations of this quantitative analysis were: a) the fact that I used a non-random sample, since the available demographic data was not reliable; and, b) the need to use an interpreter (see section 3.5.2).

3.5.2 Qualitative analysis

Qualitative data such as that coming from in-depth interviews and focus-groups was analysed using the relational data-base software, ATLAS.ti (V6.2). Such techniques were a major complement to the information collected previously via the survey questionnaires.

Conversations were entered into the software in order to build relations between statements using a protocol (that I established based on questionnaire analysis, non-participant observations and frequencies of responses) of associations between ideas and concepts. The first step was to split the recording or the transcription into several important parts also known as *quotations* (quotation is a segment from the recording/transcription that is interesting or important to the user and it could be a single character, a word, a sentence, or a paragraph up to the entire data file usually created by the researcher). After analyzing all quotations I attributed *codes* (codes are used as classification devices or *tags* at different levels of abstraction in order to create sets of related information units for the purpose of comparison), which could be repeated ideas, objects or constructs (e.g.: hunting, deforestation, animals, cashew, rice, money). When necessary, memos and comments were linked with both *quotations* and *codes* in order to subsequently refine the networks. Such procedure is named *textual analysis* (or discourse analysis). I also conducted a *conceptual analysis* where codes were linked with each other depending on the relations between words and ideas that emerged during the interview (e.g. association, contradiction, being part of another idea and so on). These links among codes were used to build the models (networks) of ideas that provided a perspective on how people perceived the topics that were discussed during the data collection [(ATLAS.ti, 2004) see Chapters 4, 5 and 6)].

Limitations of this qualitative analysis were: a) the so-called data *saturation*, which is when the data collection is no longer adding new information to the research, b) the need to use an interpreter, which could introduce flaws into the data. For example, when the subject's speech was too extensive, the interpreter might tend to simplify it during translation (Hsieh, 2007) or the interpreter may feel uncomfortable with some of the respondents' testimonies regarding specific issues (Jacobsen & Landau, 2003). When I trained the interpreters, I specifically ask them not to simplify translations, but we cannot be totally sure that some parts of the testimonies were not obliterated.

3.5.3 Mixed Method: quantitative and qualitative approach

The advantages of combining both qualitative and quantitative methodology (mixed methodology) are: a) increasing confidence in the results presented; b) strengthening the completeness of the study; c) addressing complementary questions within a single study; d) enhancement of the interpretability; e) divergences that can uncover new issues and result in the development of new theories; and, f) the researcher is closer to the research situation, contributing to a better understanding of the focus of the study. On the other hand, the disadvantages of mixed methodology are: a) it is time-consuming; b) undertaking replication and comparative studies can be difficult and expensive; and, c) researchers might be tempted to make inconsistent data sets artificially compatible in order to produce a more coherent account (Arksey & Knight, 1999).

Chapter 4

Livelihoods and Local Economies

4.1 Introduction

Differences are expected in livelihoods and local economies in each Guinean protected area. Such differences may be very important because, along with other factors, they could be responsible for the construction of local people's attitudes and perceptions towards biodiversity conservation in a particular area. The aim of this Chapter is to describe my assessment of the economic context of the two major ethnic groups, Beafada and Balanta, living inside the LCNP. It was important to assess the local economic context since I predicted that economic limitations and constraints on livelihoods imposed by the protected area will impact on attitudes towards wildlife and the Park itself – these consequences will be explored in subsequent Chapters.

Environmental conservation cannot be understood separately from its social context and it is often intimately tied in with other social issues, dramas and contests (Agrawal, 2005; Agrawal & Redford, 2006; Gezon, 2005; Haenn, 2005). Protection of tropical forests in human dominated landscapes can often produce conflict between conservation goals (e.g., biodiversity conservation) and local needs (Pfeffer, Schelhas, & Day, 2001; Pfeffer et al., 2006; Schelhas & Pfeffer, 2005). Concerns that global efforts to maintain biodiversity are in conflict with those to reduce poverty have been increasing (Sanderson & Redford, 2003).

If ecosystem protection limits agricultural development and exploitation of natural resources (Andam, Ferraro, Pfaff, Sanchez-Azofeifa, & Robalino, 2008; Soares-Filho, 2000), opposition to protected areas is frequently driven by the assumption that these impose large economic costs on local inhabitants and thus exacerbate local poverty (Brockington et al., 2006; Meijaard & Sheil, 2008). Oates (2002) argues that development, economic benefits and conservation should be taken separately. However, protected areas can also generate economic benefits through the supply of ecosystem services, promotion of tourism or by improving infrastructure in remote areas; impacts on poverty could thus be positive (Adams et al., 2004; Agrawal & Redford, 2006; Wilkie et al., 2006).

Many studies have documented high poverty levels and negative consequences for communities associated with the establishment of protected areas (Coad et al., 2008). However, those studies do not clearly demonstrate a causal link between protection and poverty because they fail to use direct measures of socioeconomic wellbeing and to control for confounding effects of geographic and baseline characteristics such as limited

infrastructure in remote areas (de Sherbinin, 2008; Upton et al., 2008; Wittemeyer, 2008).

Fortunately, the development community appears to be embracing poverty mapping and is increasingly investing in data acquisition (Henninger & Snel, 2002; WRI et al., 2007). Since protected areas are frequently established in remote areas, to judge whether protected areas are responsible for exacerbating poverty, the appropriate comparison must be between communities living in or near protected areas and communities with similar characteristics and trends that are not affected by protected areas (Ferraro & Pattanayak, 2006; Wilkie et al., 2006).

Environmental conservation in more rural countries can address people's ability to survive in a degraded environment (Redclift, 1984). It is often unclear as to how households will cope if access to natural resources is denied or supply is exhausted (Bennett, 2002; DfiD, 2002; Wilkie & Godoy, 2001). The creation of protected areas in poor regions frequently creates tensions between human needs such as for food and/or shelter and environmental conservation. Support for conservation efforts partially depends on expectations of benefits by those impacted (Pfeffer et al., 2006). In the remote regions where many of the largest protected areas are located, economic opportunities are few and populations frequently suffer from physical isolation and lack of health services and infrastructure (Izurieta, 2007).

Whether protected area management and government authorities should be doing more to spread the benefits of protection to local communities, even after the large revenues brought in by international tourism, remains under discussion (de Sherbinin, 2008). Nevertheless, information regarding poverty levels can help policy makers target those protected areas in need of intervention (WRI et al., 2007).

The pressures on biodiversity in West Africa are particularly acute and although tropical parks must emphasize basic protection with less emphasis on community development projects, the involvement of the local people in conservation efforts remains of great importance. However, the dynamics between people and protected areas may be more appropriately achieved by involving them in activities directly related to conservation efforts than with inappropriate development schemes (Oates, 2002). Understanding communities' economic characteristics allowed for a better understanding of their livelihoods risks by living within a protect area as LCNP in Guinea-Bissau.

4.2 Methods and analysis

The results presented in this Chapter come from a range of complementary approaches, incorporating both quantitative and qualitative methodology (detailed in Chapter 3). In order to know and understand the economic context of the two ethnic groups (Beafada and Balanta) living inside the LCNP, I used a combination of: i) survey questionnaires (N=258); ii) in-depth interviews (N=40 men); iii) six focus-groups (N=62 women); and, iv) non-participant observation. All of these data were collected during a period of six months over three years (see Chapter 3).

Here I present results related to the economic context for both ethnic groups in order to assess their livelihoods risks.

4.2.1 Economic Activities

In order to access data related to the economic activities regarding both ethnic groups (Beafada and Balanta) and gender, I used the items related to the economic information from the survey questionnaires (see Appendix 1). The main question: *Which kind of job pays more money to your family? (state the 3 main ones in order of importance),* was used to determine which activities were considered to be most important for both ethnic groups' economies. The main activities named by the villagers to this question were described for a better understanding (see Table 4.1). Time costs and income generation measures of the economic activities mentioned by the respondents were not collected.

This analysis included the calculation of the Weighted Rank Index (WRI) since it was phrased as a ranking question. A WRI was calculated to show the mean rank of each response category for the entire survey sample according to the following formula (Gillingham, 1998) modified from Nepal and Weber (1993). The WRI was calculated for each respondent:

$$\mathbf{WRI} = {}^{N}_{L}\Sigma\ (1/R_i)/f$$

R_i = Rank of the ith order i → N

f = total frequency of response for sample

Table 4.1: Definition of economic activities.

Main Activity	***Definition***
Bush clearance (pabi)	Activity only performed by men which consists in slash-and-burn of the forest for future crop fields.
Cashew	Both men and women activity which consists in planting (men) and harvesting (women) cashew-nuts for sale.
Commercial/Sales	Commerce of other products besides agricultural ones, such as charcoal, soap, domestic animals.
Dry rice (*mpanpan*)	Beafada's method of rice cultivation which requires forest clearing (via slash-and-burn technique).
Fishing	Activity of both men (open sea) and women (rivers and beaches): trade in local markets inside the Park.
Gardening	Activity of both men and women which consists of planting fruit and vegetables (mangos, bananas, tomatoes, eggplants, etc.) near the family house (*morança*).
Palm oil harvesting	Activity performed only by men which consists of climbing palm trees to collect the palm nuts.
Paddy rice (*bolanhas*)	Balanta's method of rice cultivation process that is performed near the mangroves and in low and wet lands (*lálas*), where no deforestation/forest clearing takes place.
Palm oil production (chabéu)	Activity performed only by women which consists of processing the nuts to make the oil to sale.
Peanuts (*mancarra*)	Activity of both men and women which consists of planting, harvesting and toasting peanuts to trade in local markets inside the Park. Peanut crops always imply deforestation.
Salt	Activity in which women collect salt from shorelines to trade in local markets inside the Park.

4.2.2 Household Possessions Score

Using questions related to livestock and other possessions materials from the survey questionnaires, a simple index for the level of material wellbeing was developed based on the calculation of possessions scores for each individual (N=258). The household possessions score was calculated with the aim of reflecting ownership of livestock and other material possessions of both ethnic groups. For each item was ascribed a point value depending on its status relatively to other items defined in terms of their economic value (see Tables 4.2 and 4.3).

In Guinea-Bissau, although there is some livestock herding, most ethnic groups are farmers rather than herders, so it was important to measure other material possessions besides livestock. To ensure that I could understand which kind of activity was providing a higher economic feed-back, I decided to use objects that implied the existence of some cash within households. This technique presented the advantage of being based on definite, rather than estimated, answers to simple questions (Smith & Sender, 1990). Using household possessions score was a way to prevent problems such as distortions in the data caused by lapses in respondent's memory, or the tendency of respondents to misrepresent their economic circumstances (Smith & Sender, 1990).

Table 4.2: List of the livestock classification.

Livestock		
Type	**Price[2] (CFA[1])**	**Score[3]**
Cattle	Adult: 175000	3
Goats	Adult: 20000 to 25000 Juvenile: 10000	2
Pigs	Adult: 20000 to 30000 Juvenile: 12500	2
Chickens	Adult: 1000 to 2500	1

[1] Currency of Guinea-Bissau: CFA = West African CFA franc
[2] The price refers to a full animal sold inside the Park boundaries (1US dollar = 542 CFA)
[3] The score was attributed according to the price of each livestock in the list.

Table 4.3: Price classification of other material possessions.

Other material possessions		
Type	**Price (CFA[1])**	**Score[2]**
Motorcycle	350000 to 400000	4
Zinc Roof	75000 to 90000	3
Bicycle	25000 to 45000	3
Mobile Phone	15000 to 20000	2
Radio	15000 to 17000	2
Flashlight	5000	1
Thatch Roof	-	1

[1] Currency of Guinea-Bissau: 1 US dollar = 542 West African CFA franc (CFA)
[2] The score was attributed according to the price of each material in the list.

Although each item from *other material possessions* was ascribed a point value depending on its economic cost, there are also *running costs* associated with particularly items such as motorcycles (diesel) or mobile phones (monthly card and diesel for the generator to charge the mobile phone) that were not taken into account.

Univariate analysis of variance (SPSS V18) was carried out to test for relationships between the household possessions score and four categorical social variables (Table 4.4). Since the variable household possessions score presented a normal distribution, parametric statistics were used and p set at 0.05. Self-reported age (see Chapter 3) was categorised here into young (those still potentially in education or not yet married), mid-aged and elders (all married and heads of households).

Table 4.4: Definitions of the categories used as social variables.

Variables	Variables categories
Age	14 – 19 years; 20 – 39 years; > 40 years
Education: *Did you attend school?*	1-Yes; 2- No
Ethnicity	1-Beafada; 2- Balanta
Gender	1-Male; 2-Female

4.2.3 Money

From the data collected during the in-depth interviews (Appendix 3) with men (for both ethnic groups) and the focus-groups (Appendix 4) with women (see Chapter 3), the answer to one of my key-questions: *How do you earn your money?*, was analyzed through the ATLAS.ti relational software. This particularly question was important to understand which were the economic activities that people rely on most to earn money to sustain their households.

During in-depth interviews (N=20 Beafada and N=20 Balanta), which were used as a major complement to the information previously collected through questionnaires, I was able to explore interesting and important aspects of the survey and look at some items in a more profound way. Some of the items explored were: 1) livelihood perceptions; 2) economic information; 3) use of the forest; 4) hunting and dietary habits; and, 5) forest conservation perceptions of both ethnic groups.

Women were always busy, being deeply involved in their daily-household (and agricultural) activities, so it was difficult for them to co-operate with us regarding data collection. Thus, the focus-group technique (N=37 Beafada and N=25 Balanta) was used in order to understand their perceptions regarding their livelihoods, the Park's existence, biodiversity conservation and the use of natural resources by women. The discussion items used during in-depth interviews with men were also used as points of discussion during the focal group meetings with women. This qualitative analysis was important as a validation of the answers given during the survey questionnaires regarding the same subject: important economic activities for both ethnic groups.

4.2.4 Risk mapping

Risk mapping was an important tool for accessing of the main daily livelihood constraints for both ethnic groups. A risk map is a tool that prioritizes and maps each risk into four quadrants of significance of threat and likelihood of occurrence (Quinn et al., 2003; Smith et al., 2000). During in-depth interviews (N=40), men from both ethnic groups were asked to mention which were the major difficulties of their villages. Neither directions nor cues were given to guarantee spontaneity and autonomy in the subjects' replies. Respondents were not restricted in the number of problems they could list. The same task was performed during women's focus-groups (N=6) in both ethnic groups. This method allowed the subjects

to decide which were the major risks rather than being told to choose from a list that was biased by the researcher (Smith et al., 2000). Risks were ranked on the assumption that the first answer was the most important.

To establish the risk maps, it was necessary to first calculate the severity index for each category given by each respondent (Quinn et al., 2003; Smith et al., 2000):

$$Sj=1 + (r-1)/(n-1)$$

r - Rank based on the order of response given by the subject
n - Total number of limitations mentioned by the same respondent

The mean distribution was calculated for all respondents who pointed out a specific problem. This created a score ranging from 1 (most severe) to 2 (least severe). To compute the sample (or subsample) Severity index, S, for a given risk, it was necessary to take the mean of the severity index for that risk from the subset of those respondents identifying that risk. Next, to measure the proportion of men and women mentioning the problem – the Incidence index (Ij) was calculated. This created a score from 0 (not mentioned) to 1 (mentioned by all respondents).

Risk index (Rj) was calculated by dividing Incidence (I) by Severity (S). For the risk index, higher values represented for larger perceived risks (Quinn et al., 2003; Smith et al., 2000).

4.3 Results

4.3.1 Education

In terms of educational infrastructure there were 13 primary schools (from the 1th until the 4th year) inside the Park. These thirteen schools were constructed before the implementation of LCNP in 2000. However, IBAP improved the infrastructure in each school. Although the infrastructure is now under IBAP responsibility, contracts and salaries paid to the teachers who work in these schools are a responsibility of Guinea-Bissau central government (LCNP coordinator, personal communication, 2011).

According to data from the survey questionnaires (Figure 4.1) the percentage of Beafada boys who attended school (79.7%) was very similar to the percentage of Balanta boys (80%) who also attended. Similarities can also be seen in the case of girls who attended school in both ethnic groups: 41.5% of Beafada girls and 46.9% of Balanta girls. Although there were almost no differences between level of education and ethnicity, there were gender discrepancies. Indeed, gender and level of education variables were statistically associated (χ^2 =34.81 S; p<0.001). Girls, from both ethnic groups, had fewer chances to attend school than did boys.

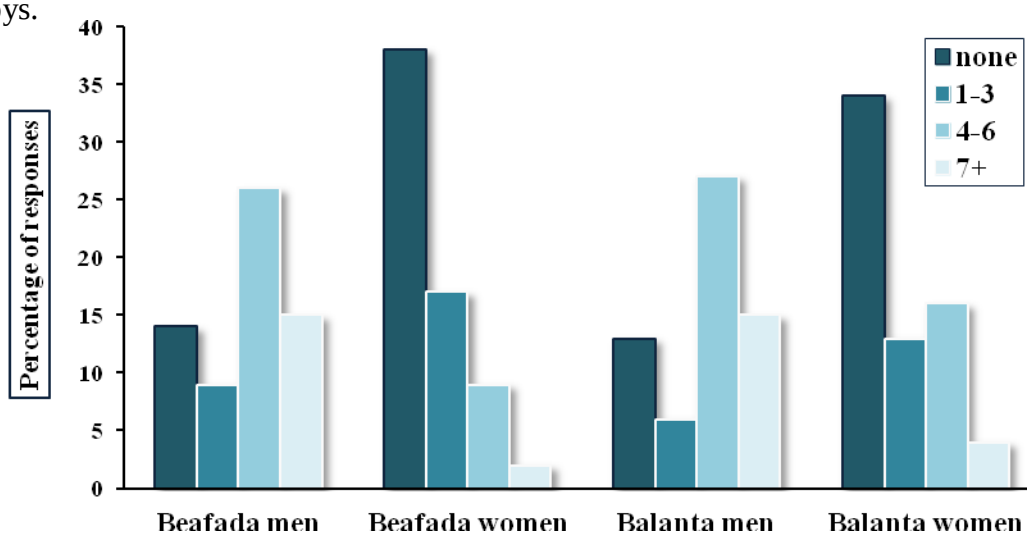


Figure 4.1: Level of education in LCNP related to gender and ethnic group according to the survey questionnaire respondents (N = 258).

According to level of education data (Figure 4.2), current young adults (73%) tended to attended school for longer periods than did people in the past. This effect was similar for both ethnic groups and gender. As previously shown for gender, age and level of education variables were also statistically associated (χ^2=34.76 S; p <0.001).

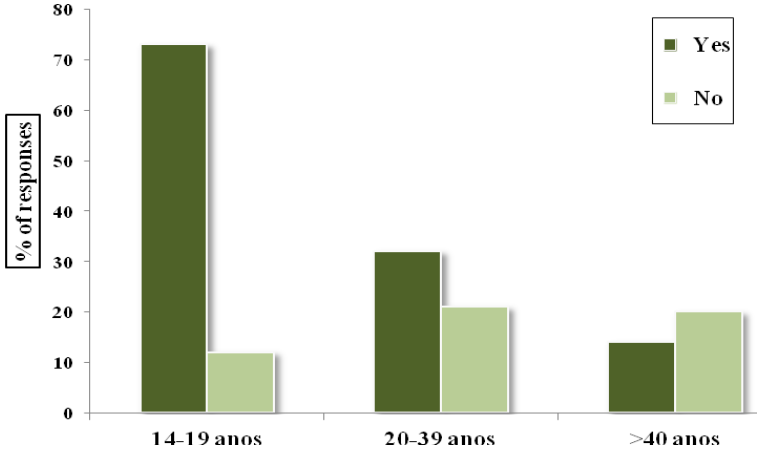


Figure 4.2: Level of education in LCNP related to age according to the survey questionnaire respondents (N = 258).

The main concerns expressed regarding education and the existing schools were: 1) the number of schools was not sufficient for all the children living inside the Park due to their distance from certain villages and also due to the rising birth rates in the country (large demographic expansion); 2) lack of specific transport for children (the only transport inside LCNP are the daily cars which transport people from Buba to Fulacunda via the main road); 3) unpaid salaries to teachers (teachers were on strike for more than three years as they had not received any salary for more than four years); and, 4) there were no secondary or high-schools [only primary schools (LCNP coordinator, personal communication, 2011)].

4.3.2 Villagers' wealth

4.3.2.1 Main Income – Related Activities

Farming was considered to be the main activity of Guinea-Bissau population, particularly rice which is the main food for household consumption and an important source of income (IBAP, 2007). Inside LCNP, the local economy was also based on farming. Agriculture was reported as the primary means of subsistence for both ethnic groups, Beafada (99%) and Balanta (96%), from the question: *Where do you get most of the food for you and your family?* (*state the 3 main ones, starting with the most important: is food purchased, hunted, grown or another)*. During the survey data collection, cashew, dry and paddy rice were named as the major sources of income (Figures 4.3 and 4.4).

As previously mentioned (Table 4.1) there were two main types of rice cultivation processes: dry or rain-fed rice (*mpampam)* and wet/paddy rice (*bolanhas de tarrafe)*. Rain-fed was mainly practiced by the Beafada and implies forest clearing (via slash and burn technique). On the other hand, wet or paddy rice (*bolanhas de tarrafe*) was mainly cultivated by the Balanta (Imbali, 1997; Temudo, 2006, 2009). This type of rice was cultivated near the mangroves and in the low and wet lands, so no deforestation takes place. It is a more conservation friendly agricultural technique (IBAP, 2007; Imbali, 1997; Temudo, 2009).

Plate 4.2: Beafada's method of rice cultivation- dry or rain-fed rice (*mpampam).*

Plate 4.3: Balanta's method of rice cultivation - wet/paddy rice (*bolanhas de tarrafe)*

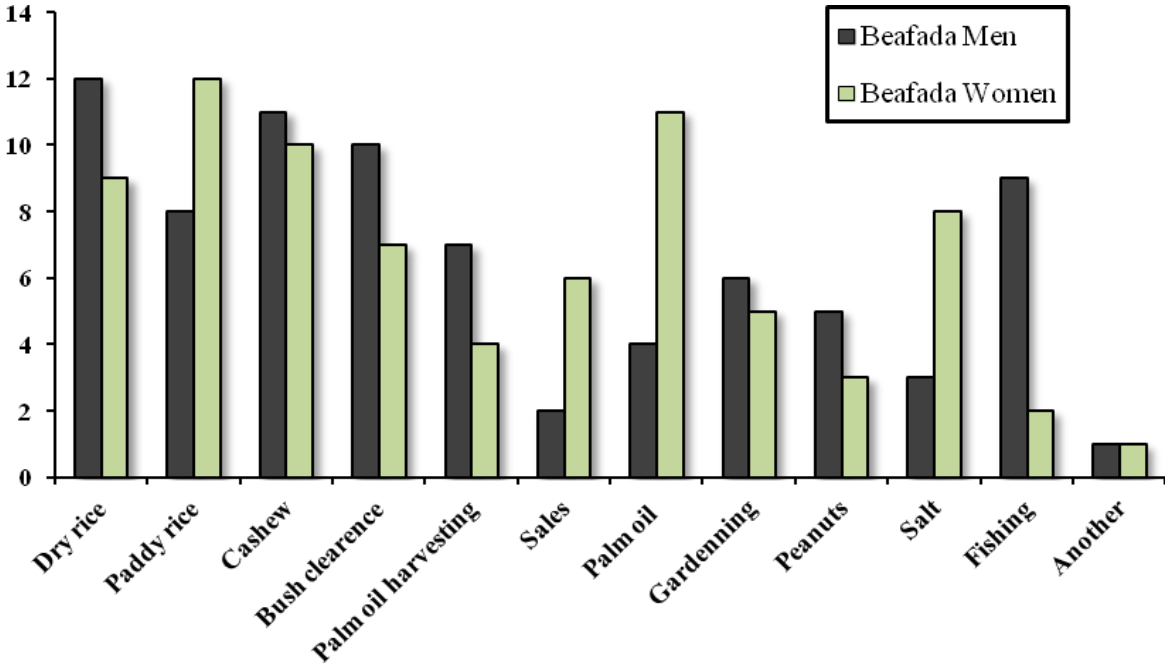


Figure 4.3: Weighted Rank Index (WRI) of the main economic activities for the ethnic group Beafada during survey data collection (N = 258).

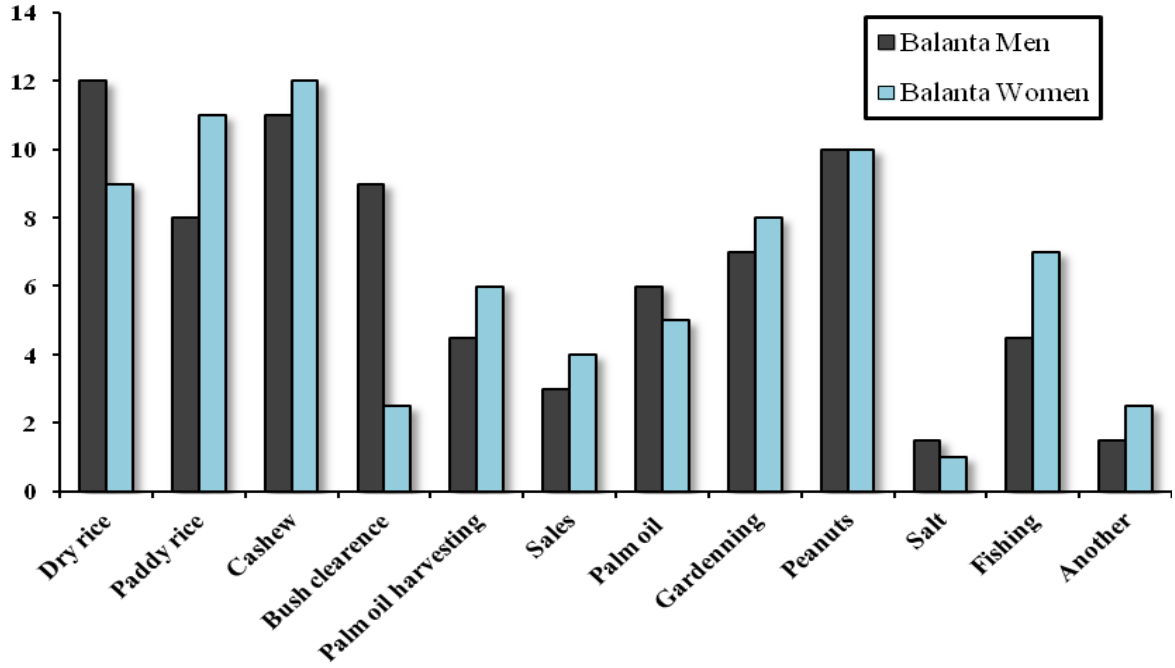


Figure 4.4: Weighted Rank Index (WRI) of the main economic activities for the ethnic group Balanta during survey data collection (N = 258).

Cash crops (Imbali, 1997; Temudo, 2009) have become a very popular activity among this population because they have a beneficial cost/benefit relation, compared with other crop activities including rice cultivation. However, along with cashew, rice continued to be an important source of income for both ethnic groups. Dry rice was more mentioned by men (both ethnic groups) and paddy rice more mentioned by women (both ethnic groups). Within the Beafada, apart from rice, bush clearance and fishing were the most frequent activities for Beafada men. Palm oil and salt selling were most frequent for the Beafada women. Within the Balanta, apart from cashew and rice, bush clearance and peanuts were the other more economic productive activities for Balanta men, but also for Balanta women in the case of peanuts. Beside these activities Balanta women relied on fishing and gardening activities.

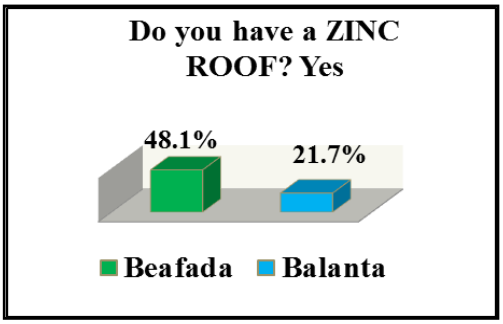
4.3.2.2 Household Possessions Score

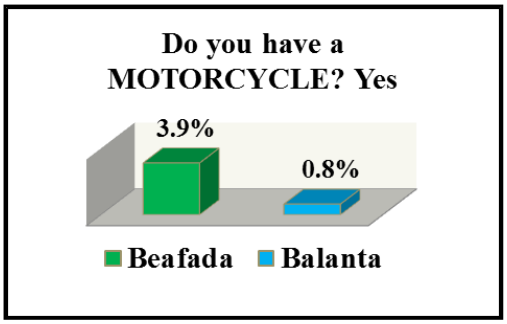
Comparison of the answers related to livestock ownership given by the Beafada and the Balanta found a major difference in the type of livestock that each one possessed. While the Beafada had mainly chickens and goats, the Balanta possessed chickens, goats, but also pigs and some cows. The main reasons for this difference were: i) the Beafada ethnic group is mainly Muslin and according to their religion they do not eat pigs so they do not raise this domestic animal, and ii) they also do not raise cows (as the Balanta do), because according to them, the Balanta steal their cattle so they gave up raising cattle to avoid conflict. These reasons explain the differences in the numbers related to the sum of scores for ownership of livestock for both ethnic groups (Table 4.5).

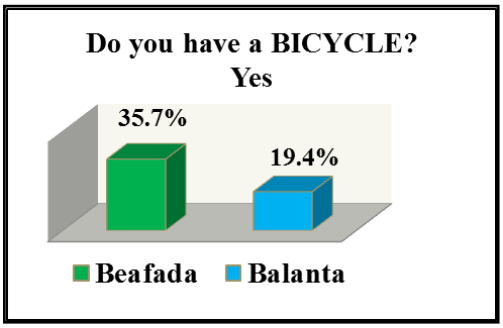
Regarding the sum of scores for ownership of other materials (Table 4.5) the total is greater for the Beafada than for the Balanta, suggesting that the Beafada spend or have more money to spend on material possessions such as: 1) zinc roofs; 2) motorcycles; 3) bicycles; 4) mobile phones; and, 5) radio. Only in the item flashlight did the Balanta have a higher value than the Beafada (Figure 4.5).

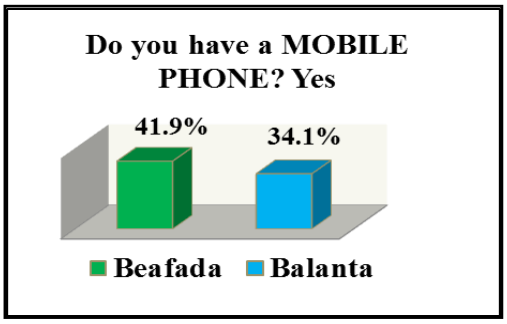
Table 4.5: Household possessions score (HPS) for each ethnic group.

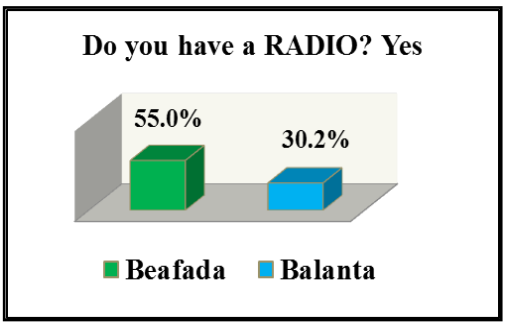
	Beafada	**Balanta**
Livestock	364	574
Other material possessions	797	574
Total	1161	1148











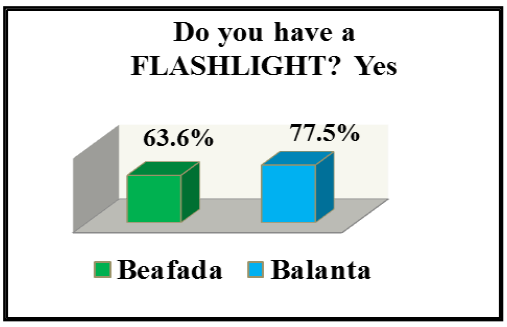


Figure 4.5: Percentages of the *Yes* answer to the question *Do you have a zinc roof/motorcycle/bicycle/mobile phone/radio/flashlight?* of the ethnic groups Beafada and Balanta during survey data collection (N = 258).

Univariate analyses explored associations between social variables and household possessions score. These tests were run using a hierarchical (Type I) model to illustrate the independent effects of each variable controlling for the initial effects of the other variables. Age of the respondent was determined during initial questionnaire administration and categorized as in Table 4.4. Education was classified into levels based on years experienced (Table 4.4) but here was entered as a single variable (some, none) to assess any effects of literacy on wealth.

(i) Age (main effect ANOVA $F_{2, 258} = 4.17$, d.f.=2, p = 0.016)

(ii) Education (main effect ANOVA $F_{1, 258} = 6.26$, d.f.=1, p = 0.013)

(iii) Ethnicity (main effect ANOVA $F_{1, 258} = 1.94$, d.f.=1, NS)

(iv) Gender (main effect ANOVA $F_{1, 258} = 5.49$, d.f.=1, p = 0.02)

(v) Age*Ethnicity*Gender (interaction ANOVA $F_{2, 257} = 4.22$, d.f.=2, p = 0.016).

Older individuals had higher household possession scores than did the younger ones although this was also a function of the ethnic group and gender. Among the Befada, older men had higher possession scores than did most other groups, while for Balanta, all women had lower possession scores than did men, and age was less of an explanatory variable for the variance in household possession scores (Figure 4.6).

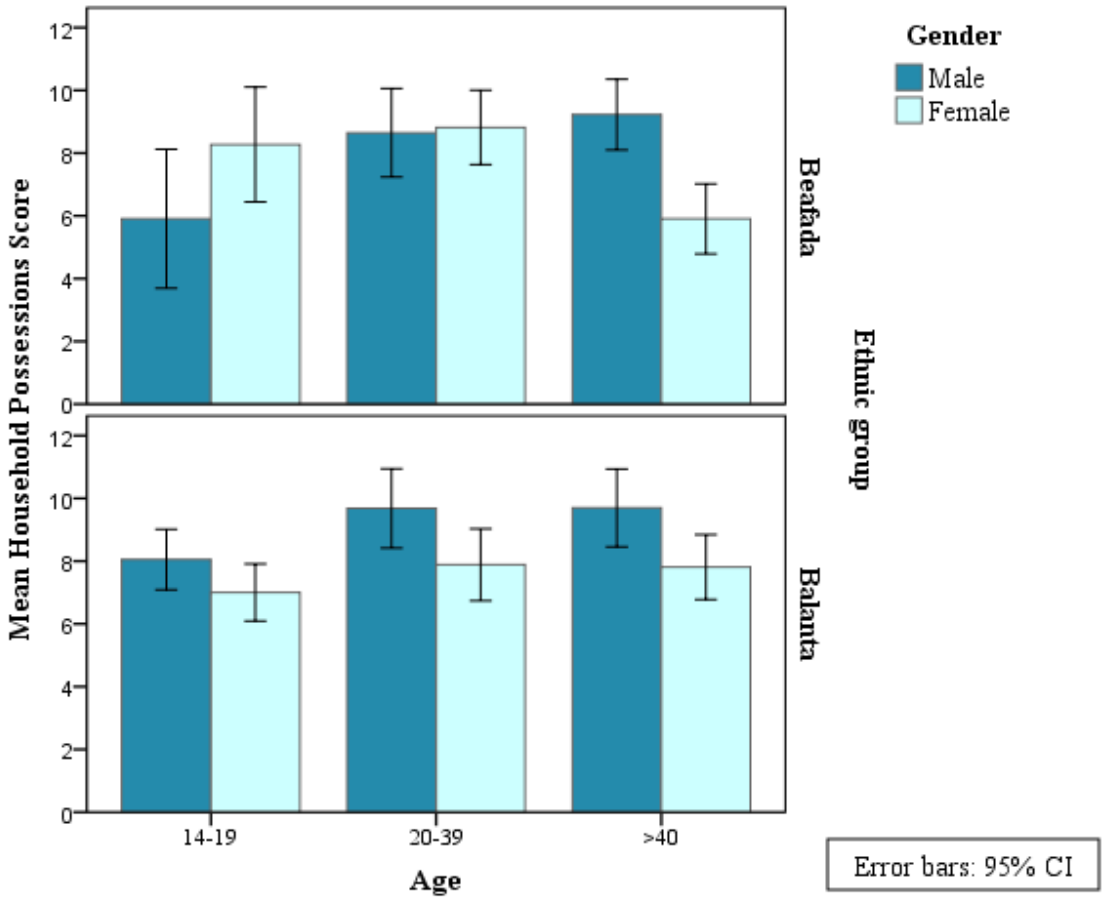


Figure 4.6: Relationship between the dependent variable Household possessions score and the interaction between the independent variables Age*Ethnicity*Gender for both ethnic groups Beafada and Balanta (N = 258).

Although there were also gender differences for Beafada in terms of the variable household possessions score, these were most marked for the elder group (> 40). In the youngest group (14 – 19), the household possessions score were lower for both ethnic groups; however, Beafada women have a higher household possessions score than did men, while the opposite was seen for the Balanta. In the middle-age group (20 – 39) household possessions score were quite similar between genders among the Beafada, with marked gender differences for this age-group among the Balanta.

4.3.2.3 Income

In order to collect more detailed economic information, during men's in-depth interviews and women's focus-groups, respondents were asked about how they earned money to sustain their households. Opportunities for income and constraints on income were expressed in the networks through linkages with the term "money". According to the responses of the Beafada men (N= 20), the majority depend on cash crops (90%) to earn money, but apart from this activity, they also relied on fishing (40%) and hunting (45%) as other important sources of money (see Figure 4.7).

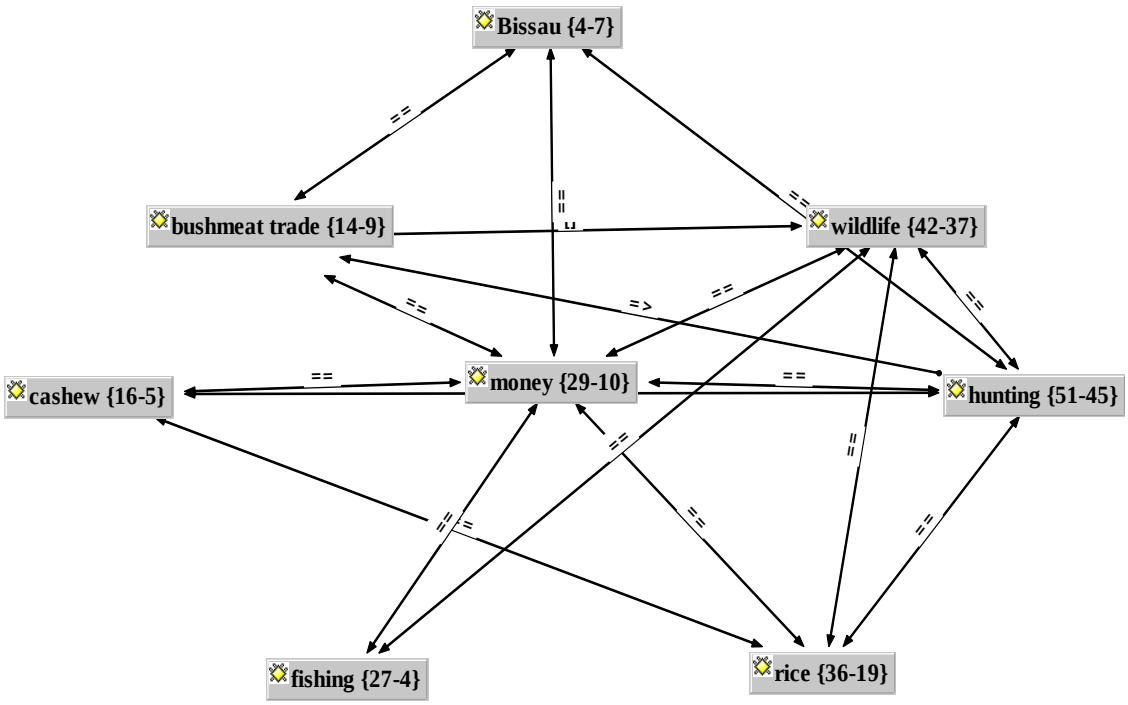


Figure 4.7: "Money" network according to the perceptions and statements of Beafada men (N=20).
For this and all subsequent figures representing networks extracted in Atlas, the signs in the arrows represent: == is associated with; [] is part of; => is cause of; <> contradicts; and isa which represent is a. The first numbers in the {} represents the number of times the code was referred to in the interviews; the second value represents the number of links with other codes.

According to Balanta men (Figure 4.8), cashew (85%) along with paddy (70%) and dry rice (65%) has become an important source of income for both ethnic groups. Nevertheless, other activities beside these three also constitute important sources of money: 1) selling of crops [peanuts, tomatoes, mangos, bananas (35%)]; 2) selling of domestic animals (15%) since Balanta do not slaughter domestic animals except for celebrations (weddings, births, funerals); 3) fishing (15%); 4) palm oil selling (12%), since palm oil is a very common ingredient in Guinean-Bissau cuisine; 5) palm oil harvesting (11%); 6) charcoal selling (8%); and finally, 7) hunting (4%) was pointed out as the activity least practiced by the Balanta men in order to get money.

Beafada men depend much more on hunting in order to get money, than do Balanta men. Balanta men exhibited a wider range of activities whereby they usually earn money. Balanta are not traditionally professional hunters as are Beafada men (see Chapters 5 and 6).

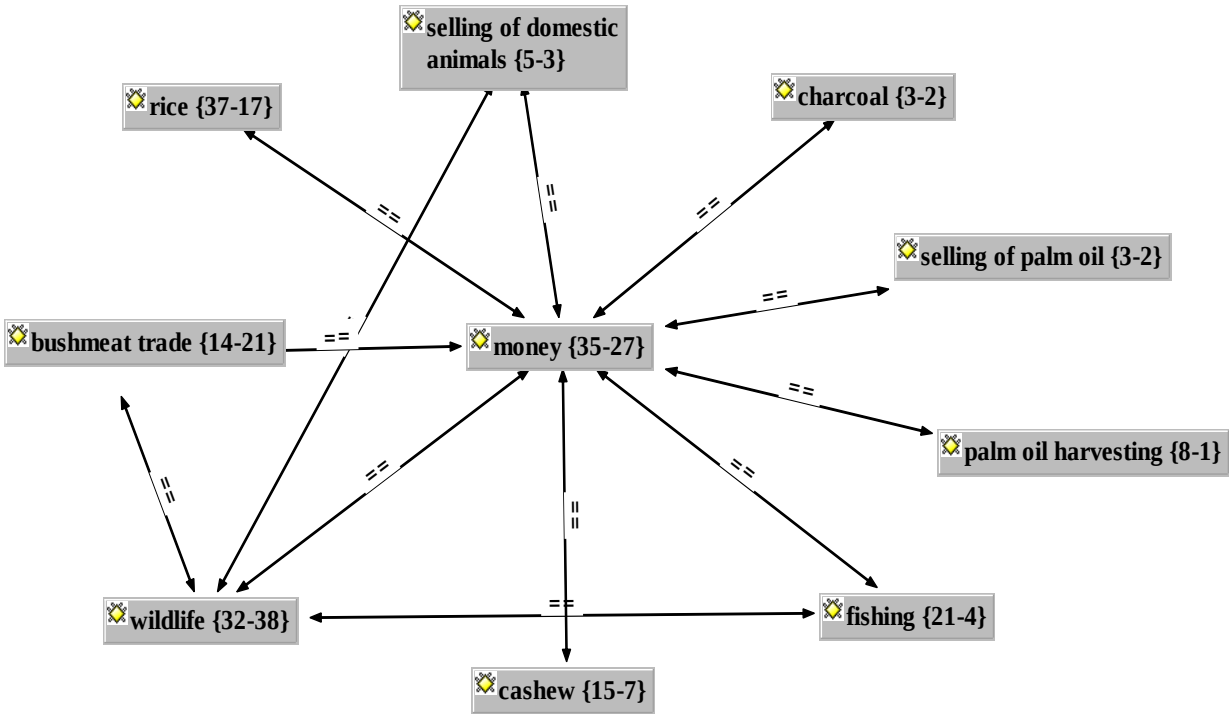


Figure 4.8: "Money" network according to perception of Balanta men (N=20).

According to Beafada women (Figure 4.9), cash crop season is the period where they get more money for their family, particularly to buy rice. During our meetings, crop-raiding, particularly caused by monkeys, cane rats and pigs was mentioned in all focus-groups (N=3 groups of Beafada women) as a major threat to agricultural success (see Chapters 5 and 6).

Particularly during the rainy season, women have to buy rice to feed their families, and in order to get money to buy such rice, they sell salt, charcoal and vegetables from their crops. Beafada women also associate money with hunting, wildlife and bushmeat trade, because according to their responses, although women do not hunt, they acknowledge that their husbands earn money from "harvesting" wildlife to sell it in the bushmeat trade circle (see Chapter 6).

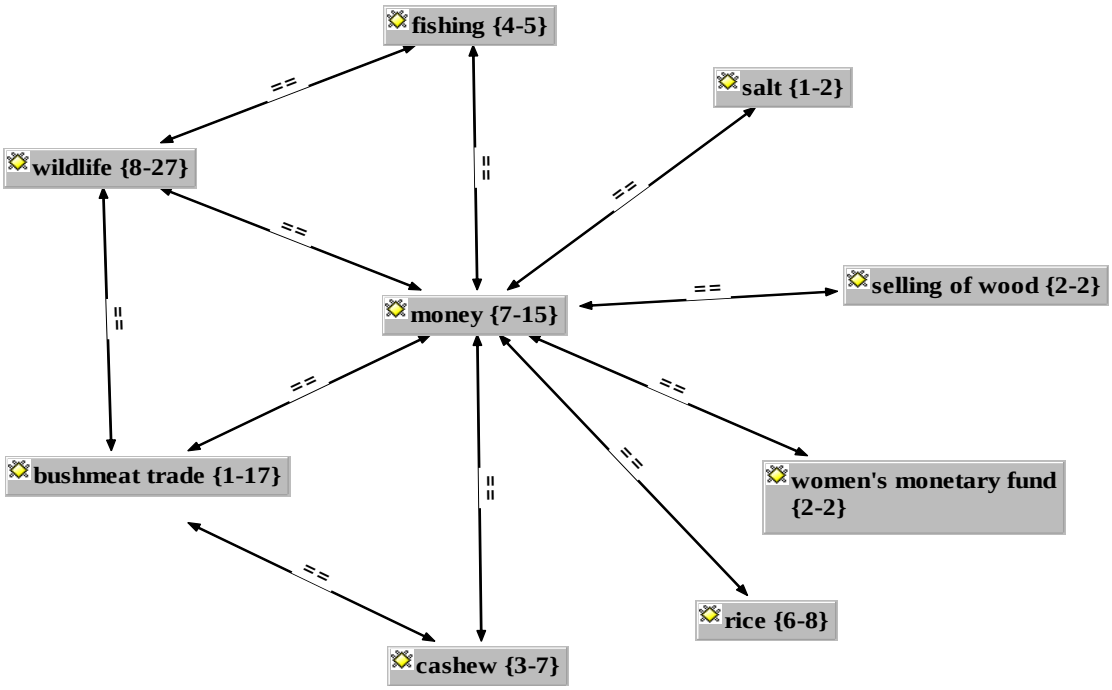


Figure 4.9: "Money" network according to the perception of Beafada women (3 focus-groups, N = 37).

Although Balanta women (Figure 4.10) also associate money with hunting and wildlife, they mostly associate bushmeat trade with Beafada hunters. According to Balanta women, Beafada men are the ones who really benefit from the hunting in terms of income (from bushmeat). Beafada men have been professional hunters for decades, not rice farmers such as the Balanta. Balanta men are still considered *amateur* hunters (for more details, see Chapter 5).

Balanta women also depend on cash crops to get money, particularly to buy rice. They are more dependent on their own rice crop – *bolanhas de tarrafe.* However, when their crops are damaged by wildlife crop-raiders (monkeys, cane rats and pigs), they get money from palm oil, charcoal and selling of other farm products (cashew, lemons, peanuts, corn).

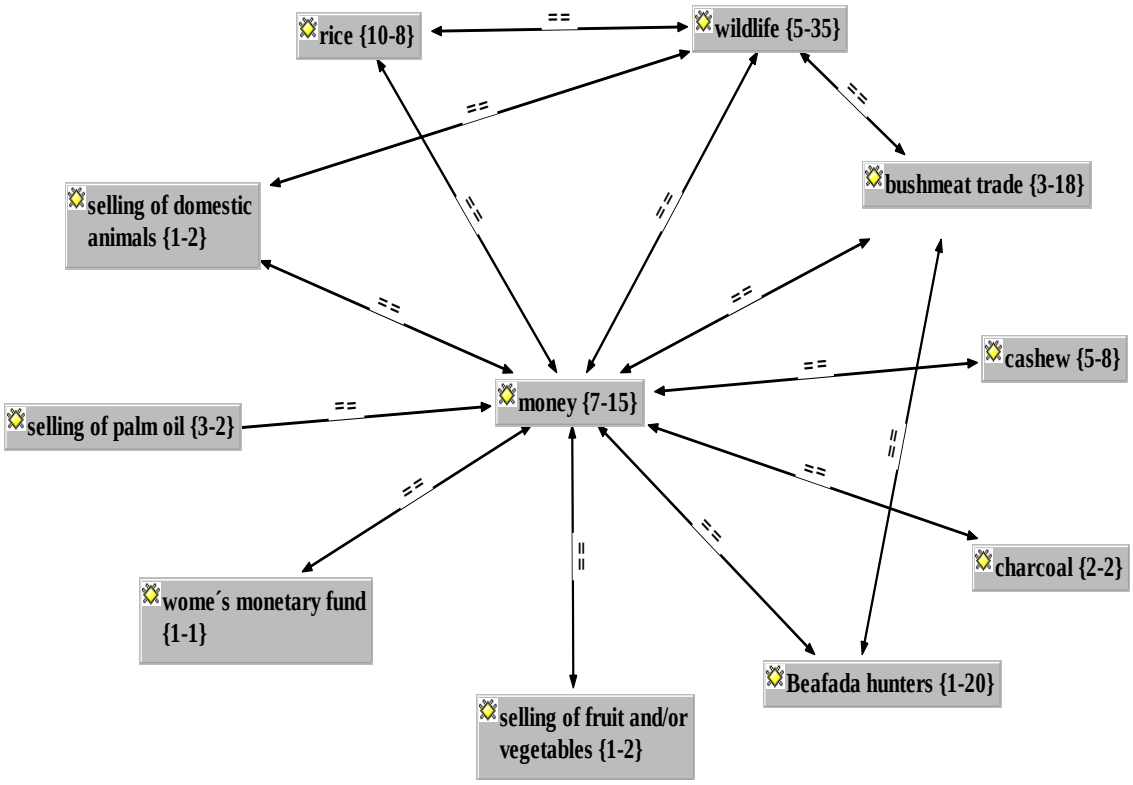


Figure 4.10: "Money" network according to the perception of Balanta women (3 focus-groups, N = 25).

4.3.3 Health

Regarding health infrastructure there was an infirmary in one village inside the LCNP (Indjassen - near Corubal River at north) and basic health units in Bacar-Conté (near Corubal River at north), MadinaAtche and Gã-Gregório [both located in the main road of the Park villages (see Figure 2.4 in Chapter 2)]. None of these units or even the infirmary was working during the three years of my study. There were no practitioners, nurses or medicines available. All infra-structure was built by different NGOs. Local people can go to the hospital only in Buba or Fulacunda cities (see Figure 2.4 in Chapter 2), but once these hospitals became the responsibility of central government, they did not function well as no resources were available. Salaries for medical doctors, nurses and other staff are a responsibility of the Guinea-Bissau central government rather than the NGOs that established these facilities (LCNP Coordinator, personal communication, 2011).

During the interviews local people from both ethnic groups (Figures 4.11 and 4.12) and genders often complained about the lack of existence of a health infrastructure that actually worked. For many people going to the nearest hospital, in Buba or Fulacunda, means travel of least 60 km. For some people whose villages are extremely far from these two cities,

such distance is not possible to manage. As previously mentioned, the only transport inside LCNP are the daily cars which transport people from Buba to Fulacunda and vice versa, but these cars only travel along the main road which is hard to reach for peoples whose villages are far away and who lack transport such as a motorbike or bicycle. Villagers who live near Corubal River (at the northern border of the LCNP - see Figure 2.4 in Chapter 2), have to walk several miles since they do not have access to any transport until the main road. Some people use canoes donated by IPAB to go to Xitole (city on the north bank of the Corubal River) to have access to health care.

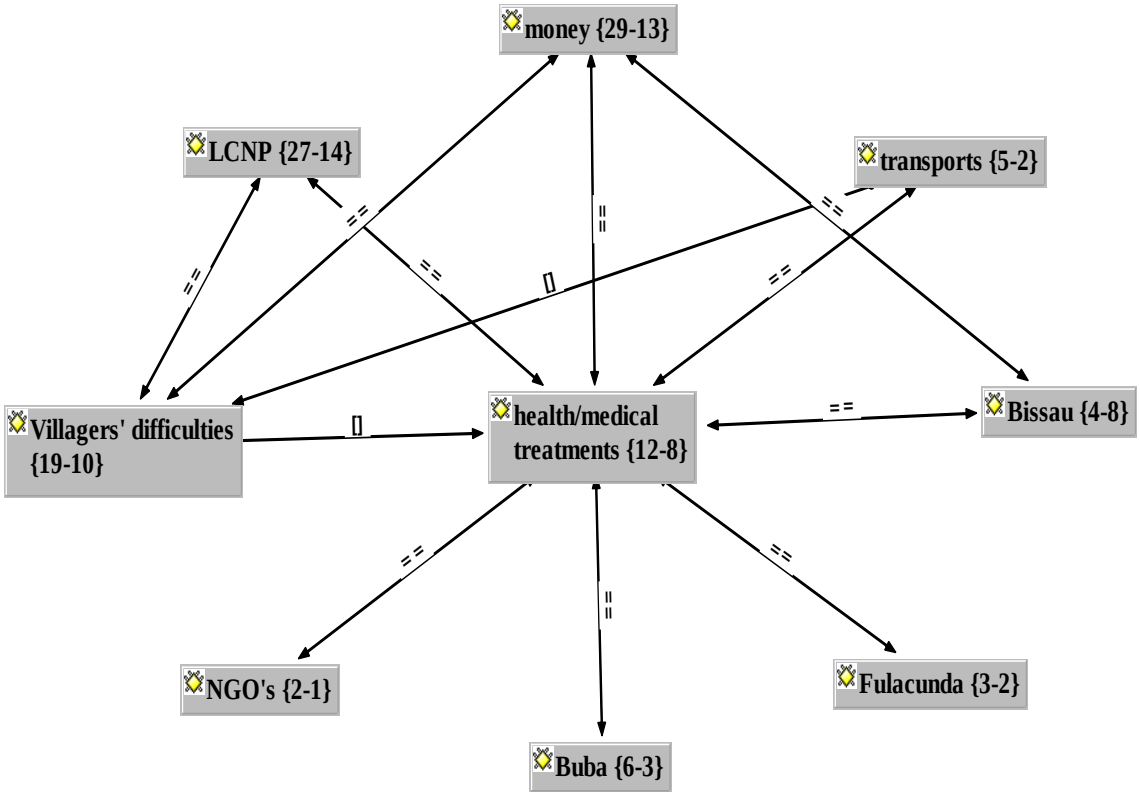


Figure 4.11: Network of Infirmary and other basic health units according to the perception of Beafada men (N=20).

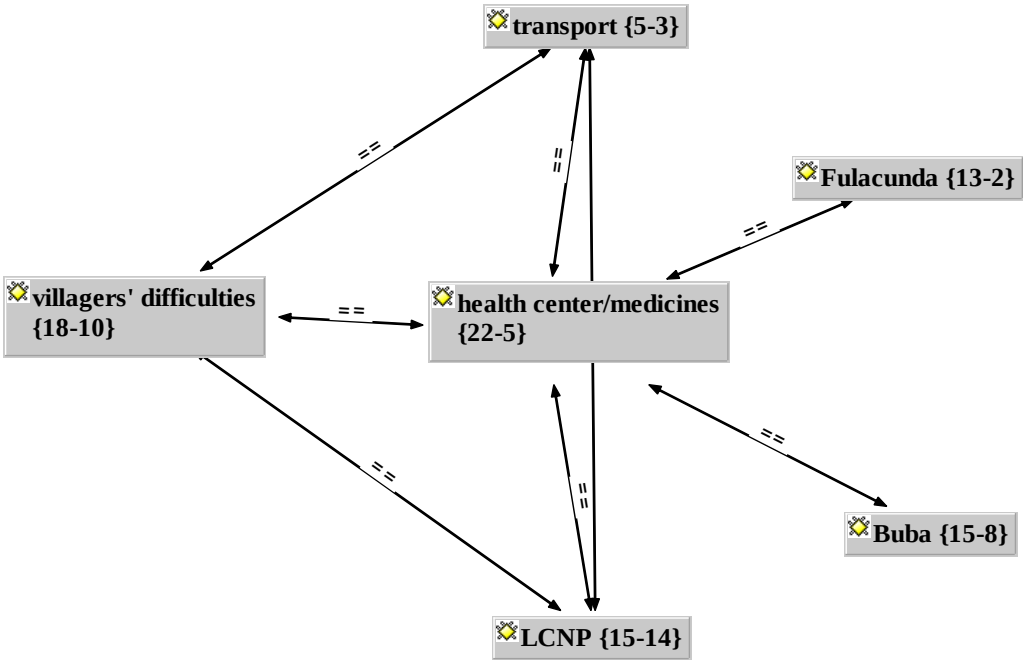


Figure 4.12: Network of Infirmary and other basic health units according to the perception of Balanta men (N=20).

Regarding health infrastructure, medication and medical treatment, women expressed very similar opinions to those of men: 1) lack of money to pay for medicines and transport; 2) lack of transport near their villages; 3) hospital location only in Buba, Fulacunda or Xitole cities (for those who live closed to the Corubal River). Furthermore, these women are also mothers and the majority of them (of both ethnic groups) told me that they usually have their babies at home by themselves (with no assistance) or with the help of a midwife from the village.

We help each other during labour, here we do not have a midwife, Bida is the one who help us. In my case I had my children during the night and I did not disturb any one, I had my first baby and after an hour I had my second one. My sister helped me after labour with a warm bath.

(Balanta woman from women focus-group in Nbindé village)

Here sick people have a lot of difficulties, because we do not have a car, usually we walk. Some sick people go by bicycle. Most of women have their babies at home, others in Buba when it is possible to get there. Here in Gã-turé we have a midwife who helps us during labour and also with the bath; after that, the midwife leaves.

(Balanta woman from women focus-group in Gã-turé village)

Women are also responsible for the health of their children: they are the ones who go to the hospital when their babies or children need medical attention, pay for their medical appointments (usually nurses are present) and buy medicines when needed. Women complained about the lack of help regarding the payment for medical appointments and the need for medication. Fortunately, most children have their vaccination plan updated due to the work of NGOs in the Park. Though malaria was highlighted as the major health problem for these women, chicken-pox and measles are diseases that also concern mothers living inside the LCNP.

When our children are sick we go to Buba. We have a hospital here in Bacar-Conté, but it does not work, there are no doctors or medicines. We work in the rice fields and we sell it to have some money for the medical appointments for the children. Otherwise our children die here. This is one of our biggest concerns.

(Beafada woman from women focus-group in Bacar-Conté village)

When we are sick we go to Fulacunda, usually we walk because we cannot afford the costs of the car renting. When women are pregnant they prefer to have their babies at home because of the hospital cost. However, when it comes to children we take them to Fulacunda for their vaccination and consultations.

(Beafada woman from women focus-group in Bubatchingué village)

4.3.4 Risk mapping

In order to establish risk maps for this study (see section 4.2.4 for methods and rationale) responses in relation to 12 groups of activities or constraints were categorized. These were: limited water availability [Borehole]; limited food availability in terms of rice and meat especially [Food]; crop destruction by wild animals [Crop-raid]; limited access to health services [Health]; limited access to higher levels of schooling, for instance secondary and women's schools in LCNP [School]; access to income [Money]; access to transport [Transport]; improvement of the existing roads infrastructure [Roads]; machines to work in *bolanhas* either as tractors or mechanical cultivators/ploughs [Plough]; machine to mill or polish the rice [Rice mill]; availability of land for *bolanhas* [Bolanhas], and a machine to extract palm oil [Palm oil press]. The risk perceptions of each ethnic group (Beafada and Balanta) by gender were converted in severity (S) and incidence (I) measures (Tables 4.6 to 4.9).

Table 4.6: Beafada men's risk perceptions.

	Severity index	Incidence index	Risk index
Borehole	1.35	0.35	0.25
Food	1.5	0.1	0.06
Crop-raid	2	0.1	0.05
Health	1.42	0.55	0.38
School	1.77	0.15	0.08
Money	1.5	0.1	0.06
Transport	1.75	0.2	0.11
Roads	1.25	0.2	0.16
Plough	1.4	0.25	0.17
Rice mill	1.75	0.1	0.05

Table 4.7: Balanta men's risk perceptions.

	Severity index	Incidence index	Risk index
Borehole	1.47	0.3	0.20
Food	1.26	0.25	0.19
Crop-raid	1.33	0.05	0.03
Health	1.83	0.85	0.46
School	1.42	0.3	0.21
Money	1.12	0.2	0.17
Transport	1.79	0.2	0.11
Bolanhas	1.16	0.2	0.17
Plough	1.75	0.1	0.06
Rice mill	1.5	0.05	0.03

Table 4.8: Beafada women's risk perceptions.

	Severity index	Incidence index	Risk index
Borehole	1	0.06	0.06
Food	1.5	0.08	0.05
Health	1.67	0.06	0.03
Women school	1.33	0.06	0.04
Money	1.5	0.04	0.02
Transport	1.5	0.05	0.03
Plough	2	0.33	0.17
Rice mill	1.5	0.12	0.08

Table 4.9: Balanta women's risk perceptions.

	Severity index	Incidence index	Risk index
Borehole	1.16	0.06	0.05
Food	1	0.05	0.05
Money	2	0.05	0.02
Transport	1.67	0.09	0.05
Plough	1.67	0.16	0.09
Rice mill	1.33	0.16	0.12
Palm oil press	2	0.16	0.08

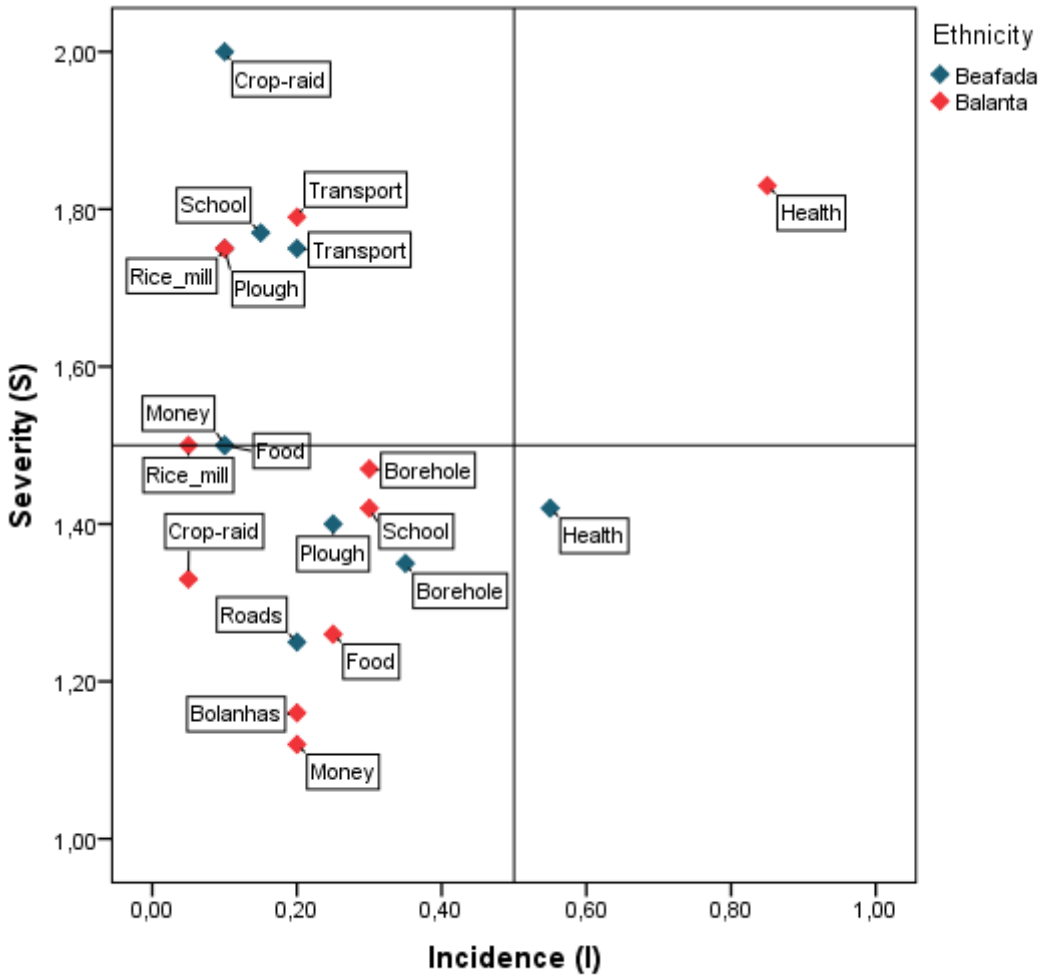


Figure 4.13: Beafada and Balanta men risk map overview.

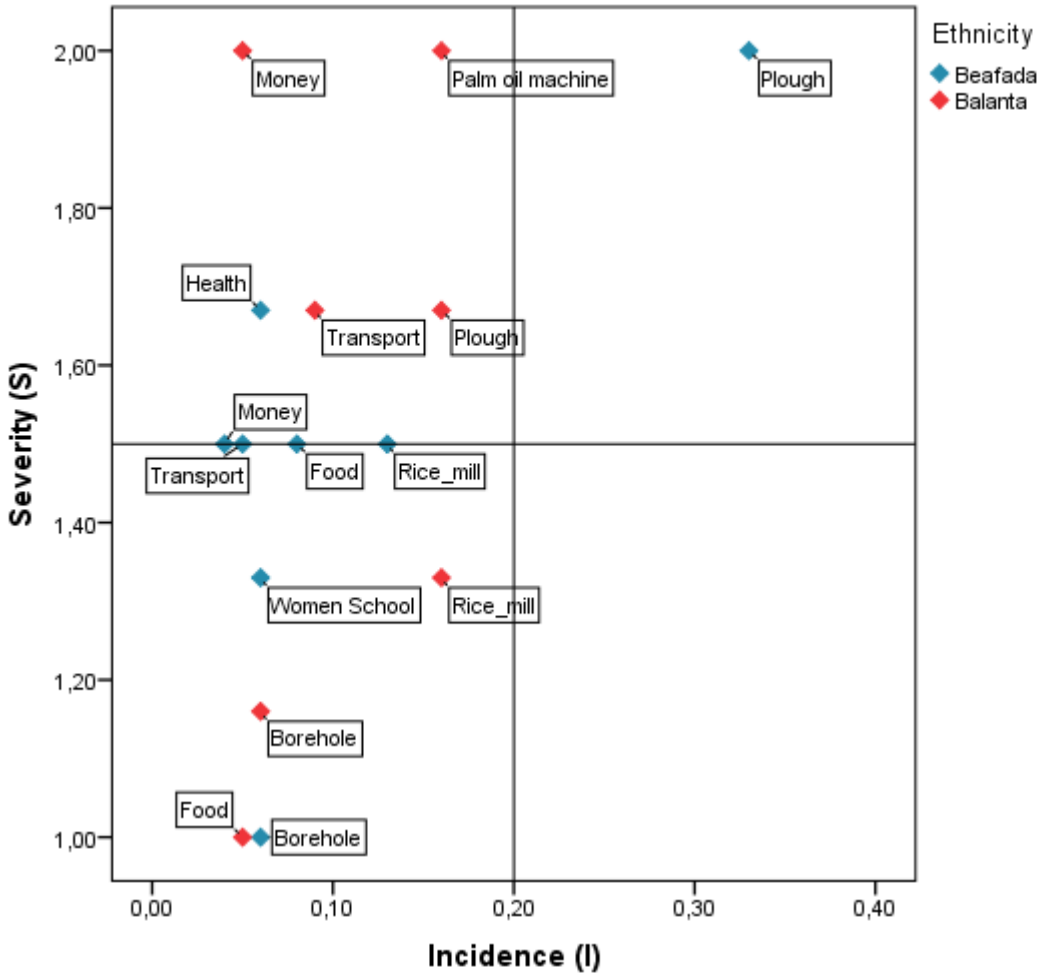


Figure 4.14: Beafada and Balanta women risk map overview.

Comparing both risk maps (Figures 4.13 and 4.14), there is evidence that for both Beafada and Balanta men, health is the problem that subjects mentioned most often although with different severity levels. For women, lack of ploughs and rice-milling machines, for Beafada and Balanta respectively, came as their biggest concerns.

Outside health, none of the other 11 risks were stated by a majority of respondents. Water and transport availability were the other risks cited by men of both ethnic groups with similar levels of incidence and severity between them. Schools, crop-raiding and money, however presented different levels of both severity and incidence between men in the two ethnic groups.

Women seem to be more concerned about the help that LCNP could provide to them (or what they feel should be provided, whether realistic or not, or whether part of the remit of

the Park) in term of field working, such as ploughs, rice mills and palm oil presses. Other than ploughs for Beafada women, none of the other 11 risks were mentioned by a majority of respondents. Water and food availability were the primary other risks cited by women from both ethnic groups.

In both risk maps, a few risks were mentioned by a majority of the population, those that appear in the right half of the Figures 4.13 and 4.14. There are only two risks (health – Figure 4.13 and plough - Figure 4.14) that were widely mentioned and also deemed relatively severe (the upper right quadrant). There were a higher number of risks that were intensely experienced by a small subpopulation (the lower left quadrants) and finally a few other risks perceived by a subpopulation but ranked as least severe (the upper left quadrant).

4.4 Discussion

Livelihoods and local economies might differ in each protected area of Guinea-Bissau and understanding this diversity may be very important for the interpretation of local attitudes towards biodiversity conservation within a particular protected area (Bauer, 2003; Gibson & Marks, 1995; Jones, 2001). When LCNP was created in 2000, several ethnic groups had been living in this area for generations prior to the establishment of the Park. Currently the predominant ethnic groups are: the Beafada (77.4%); Balanta (8.7%); Fula (3.6%); Manjaco (3.6%); Pepel (2.6%); and Bijagó, Mandiga, Mancanha [combined at 4.1% (Imbali, 1997)].

Cashew, dry and paddy rice were the major sources of income for the main ethnic groups of Beafada and Balanta. However, other activities were mentioned due to their economic value to villagers' livelihoods such as hunting, fishing, crop selling and other forest products (charcoal, palm oil). An important difference between these two ethnic groups is that Beafada men rely more on hunting (Muslins are heavy involved in the bushmeat trade) for cash than do the Balanta men (for more detailed information see Chapters 5 and 6).

Balanta women also associate income with hunting and animals, but instead of hunting for sale (among their own ethnic group); they associate income with Beafada hunters because these are the people who really benefit from hunting in terms of income. Balanta are not *traditional* hunters. They mainly use dogs to hunt and not guns; however, among the Beafada there are professional hunters who hunt every day with firearms. Learning how to be a

professional hunter is part of Beafada and Fula culture. The Balanta are mainly farmers of the *bolanha de tarrafe* and cattle breeders (Temudo, 2006), not hunters. Such features give Balanta higher food security in terms of rice (for more details on this subject see Chapter 5 and 6).

In terms of the household possessions score this was higher for Beafada than for Balanta. Balanta had more of only one material possession, the flashlight, which could be explained by the dispersed and independent way Balanta construct their households (Hawthorne, 2001). This dispersion is mainly a result of the demands of their rice crop cultivation process (see Chapter 2) and because Balanta do not display the same political centralization structure of power as seen among the majority of the other ethnic groups near the coast (Nóbrega, 2003). Due to this dispersion, they might use more flashlights than the household who live closer to each other. Furthermore, the Balanta exhibited more gender differences in terms of the household possessions score between the different age-stages than did the Beafada.

Women in LCNP have fewer chances to attend school than do men, following the trend that the number of girls who abandoned education or never got the opportunity to go to school was higher than that for boys. Disparities and lack of opportunities for women are seen in all areas and sectors of the country (DENARP II, 2011). Women continue to have limited access to information because of their poor levels of literacy and low income but also due to the marked gender differentiation in role and power in most of Africa (Chambers, 2007; Esterhuyse, 2005; Moser, 2007; UNDP, 2006).

Almost no health care is provided by NGOs, the government or the Park itself in order to guarantee healthy pregnancies or healthy children. Appointments with doctors, medicines and transportations need to be paid for by the patients or by their families. Since financial constraints are the rule, life expectancy continues to be low (UNDP, 2006). In low income countries the correlation between the size of protected areas and infant mortality rates in surrounding areas is positive and significant, seemingly confirming that large and restrictive protected areas exacerbate poverty in their regions (de Sherbinin, 2008). However, in the remote regions where many of the largest protected areas are located economic opportunities are few and populations frequently suffer from physical isolation and a general lack of health services and infrastructure (Izurieta, 2007). These latter elements seem to be associated with

the risk that men in particular have mentioned as their most significant concern. Women seem to be more concerned about the help that they believe, realistically or not, the LCNP or partner organizations potentially could provide to them in terms of field work equipment, such as ploughs, rice mills and palm oil presses. This belief is not surprising since women often complained about the amount of work that they have (inside the house and labour on fields).

4.5 Conclusions

The aim of this Chapter was to explore and describe the economic context of the two major ethnic groups in the LCNP. It was important to assess the local economic context since I predicted that economic limitations and constraints on livelihoods perceived of as imposed by the Park will impact on attitudes towards animals and the Park itself – these consequences will be explored in subsequent Chapters. Although, this study has not demonstrate a causal link between protection and poverty (de Sherbinin, 2008; Upton et al., 2008; Wittemeyer, 2008) it has embraced poverty mapping in order to perceive the risks for both local populations, Beafada and Balanta, associated with living within a protected area. Park creation and implementation for the purpose of conservation could result in significant opportunity costs and benefits (Casse, Nielsen, Ranaivoson, & Randrianamarivo, 2005; Coad et al., 2008; Pfeffer et al., 2006) that will be analyzed in Chapter 5.

Chapter 5

Protected areas: How do local people see them?

5.1 Introduction

In this Chapter I evaluate the reported perceptions of the local people towards the LCNP. This evaluation was necessary in order to address hypotheses about how the operation of the LCNP area structures or underlies attitudes to conservation in the local area. Negative or positive attitudes will determine whether the LCNP can be sustained and whether any animals or threatened plants will remain into the future.

Behaviours and attitudes changes depend on social orientations which are associated with our social representations or perceptions of the reality (Casanova, 2004; Smith & Mackie, 2007; Yzerbyt & Leyens, 2004). Social orientations represent cultural features; they usually are durable, but not unchangeable since their development depends on social relationships [Casanova, 2004; Smith & Mackie, 2007; Yzerbyt & Leyens, 2004 (see Chapter 1)].

Setting up protected areas continues to form the main response by the international conservation community to the threats facing biodiversity (Adams et al., 2004). While parks can generate significant benefits (Andam et al., 2010; Balmford et al., 2002), considerable costs frequently accrue to communities living in or near protected areas due to species protection, especially when these species are edible or cause damage and/or with exclusion from areas or resources (Brechin et al., 2003; Coad et al., 2008; Igoe, 2006; Roe & Elliott, 2004).

As outlined before (see Chapter 1), there are two broad camps within the international conservation community: (a) nature protectionists (NP), a group comprised of conservation scientists who embrace the strong preservationist mission and defend an undiluted protected areas model as the best means to protect biodiversity (Katz & Oechsli, 1993; Kramer, van Schaik, & Johnson, 1997; Oates, 1999, 2006; Redford, 1992; Redford, Brandon, & Sanderson, 1998; Sanderson & Redford, 2003; Terborgh, 2000, 2004; Terborgh, van Schaik, Davenport, & Rao, 2002); and, (b) social conservationists (SC), a category which tends to include environmentally-oriented social scientists (anthropologists, political ecologists and rural sociologists) who view conservation efforts as a mean to address social, cultural, and political goals such as poverty alleviation, economic development and political participation (Brockington et al., 2006; Chapin, 2004; Gillingham & Lee, 1999; Roe & Elliot, 2004, 2006; Sachs et al., 2009; West et al., 2006).

Inclusive National parks model (model based on a philosophy of local participation and stewardship) are politically appealing alternatives to the conventional *fortress* park model, because they attempt to protect biodiversity and provide for human needs, including potential positive results in the increase of local control over resources, greater autonomy, and higher income for park residents (West & Brechin, 1991; Wilhusen et al., 2002). Research in Costa Rica and Honduras has been conducted to examine and compare local people's environmental and forest-related values and behaviours in order to evaluate the effect of park´s management on their expectations in different social and environmental contexts (Pfeffer et al., 2001, 2006; Schelhas & Pfeffer 2005, 2008). This work suggested that the National parks with local ownership model generates greater expectations of benefits on the part of local residents compared with an exclusionary *fortress* park model, which ignores the socioeconomic situation of many families living in or near protected areas (Pfeffer et al., 2006).

However, some local conservation with development strategies such as: the role of environmental education or livestock production, have failed to generate sufficient and relevant benefits for local populations (Brown, 2002; Oates, 1999; Wilkie & Carpenter, 1999). There can also be political dimensions to benefit distribution, with governments potentially unwilling to relinquish revenue to local communities (Nelson, Nshala, & Rodgers, 2007).

Communities are not homogenous (Bauer, 2003; Jones, 2001), "the local" is an intricate and complex amalgamation of trans-boundary political interests, economic dependencies, cultural and social ties, ecological circumstances, historical events and traditions (Bassett, Blanc-Pamard, & Boutrais, 2007; Wittmayer & Büscher, 2010). Factors such as spatial and temporal distribution of costs and benefits are also crucial, since considerable long-term benefits may still fail to compensate relatively small short-term costs (Casse et al., 2005). Benefits may be provided in a form which individuals fail to value, a school that has been built could fail in filling the livelihood gap caused by removal of hunting rights within a household (Gibson & Marks, 1995).

Problems of inequality in benefit perception may be related to poor communication, where people simply do not have sufficient information regarding the existence, scale and availability of either relevant costs or benefits (Gursoy, Jurowski, & Uysal, 2002; Sandbrook,

2006). It is important that projects have a firm understanding of the value or appropriateness of benefits provided to the local community, for which an in-depth understanding of the complexities and needs of the population in question is critical (Gibson & Marks, 1995).

It is often stated that rural populations depend or rely on wildlife products and that the forest is necessary to them (Fa et al., 2003; FAO, 2011; Milner-Gulland et al., 2003). The economy of large areas of the West African rain-forest zone is based on relatively intense agriculture and/or the commercial exploitation of natural resources, including timber and bushmeat (Oates, 1999, 2002). Throughout West and Central Africa, bushmeat hunting levels are likely to be unsustainable (Robinson & Bennett, 2002). Therefore understanding how exclusion from hunting will affect attitudes to protected areas is fundamental in areas of bushmeat use.

In order to examine the relationship between poverty and the use of bushmeat, within a Congolese agricultural community (Kiliwa) de Merode and co-workers (2004) found that wild bushmeat was not a major component in the diet of the households investigated. The bushmeat consumption per capita was only 0.04 kg per day, which seems relatively low in comparison to previous studies of agriculturalists in the Congo Basin (Wilkie & Carpenter, 1999). The authors (de Merode et al., 2004) suggested possible explanations for this difference: 1) Kiliwa households were living in extreme poverty and many could not afford the equipment necessary to hunt meat or the disposable income necessary to purchase meat; and, 2) households that could afford it tended to sell the meat because there were relatively few alternative sources for income generation, due to the remoteness of this village and political instability in the region. However, bushmeat may still become an important diet component when agricultural products are scarce and households are most vulnerable in terms of food (Allebone-Webb, 2009; Chambers, 1997; de Merode et al., 2004; Nasi et al., 2008).

West African managed forests are zones in which domestic livestock does not thrive; bushmeat continues to be a major source of animal protein for many people, including those who have migrated to cities (Oates, 1999, 2002). Bushmeat appears to be much more important as a source of income than as a source of food, because over 90% of production of bushmeat and fish is sold at markets (de Merode et al., 2004; Kümpel, 2006; Nyahongo et al., 2009; Wilkie & Godoy, 2001). Thus, bushmeat helps households to purchase important commodities, such as medical supplies, clothes and so on (de Merode et al., 2004). Two

studies of bushmeat hunters in the Central African Republic (Noss, 2000) and Congo (Eves & Ruggiero, 2000) also found that hunting generates a substantial cash income. The importance of wild foods as a source of cash income becomes even more accentuated during the *hungry season* (de Merode et al., 2004).

Although some argue that increasing wealth may lead to decreasing consumption of wildlife (Dei, 1989; Scoones, Melnyk, & Pretty, 1992), Wilkie and co-workers (2005) suggested the opposite. Wealthier households in Gabon consumed more animal protein than the poor ones. A small increase in the wealth of poor families had a far greater absolute impact on meat consumption than a comparable increase in the wealth of relatively rich families. Thus, successful development assistance efforts to alleviate rural poverty may have adverse effects on the conservation of wildlife species most threatened by bushmeat hunting (Wilkie et al., 2005). Findings from the de Merode and co-workers (2004) study also showed that the value of wild foods for both consumption and market sales was greatest in the wealthier households.

Bushmeat hunting and trading in Africa is rarely actively regulated or managed (Evans, Gill, & Kümpel, 2011). In Guinea-Bissau, hunting of primate species is illegal; however, large quantities of primates are still hunted for the bushmeat trade (Cá, 2008; Casanova & Sousa, 2007; Gippoliti & Dell'Omo, 2003; Ferreira da Silva, 2012). In the few countries that have transcribed some sort of regulation into law, it remains unenforced due to a lack of capacity (ODI, 2003). The lack of government control and enforcement leaves the trade virtually open, regardless of species' legal status, and primates are still traded openly at urban bushmeat markets (Gill, 2010). Wildlife management efforts must go hand in hand with those for poverty alleviation if endangered wildlife species are to survive the expected increase demand for bushmeat that may accompany the rising wealth of poor families (Wilkie et al., 2005).

5.1.1 Hypotheses

The Chapter will test the following hypothesis:

(I) People who lose livelihoods as a result of constraints imposed by the protected area will hold negative values, perceptions and attitudes towards that same protected area (LCNP).

Suggestions for dealing with any negative perceptions that are identified are:

(i) Finding alternative solutions to the limitations imposed by the LCNP on economic activities and livelihoods will produce positive attitudes towards the protected area and conservation more generally.

(II) The global political context for biodiversity conservation will be divorced from the local political context in terms of attitudes towards conservation.

Suggestions for dealing with the diverse of the local from the global may be:

(i) Solutions need to be local and emergent – these have to incorporate local inhabitants' needs into effective action that returns the biodiversity "values" back to local communities.

These suggestions for dealing with any political and perceptual problems that are identified in this Chapter may not be able to be addressed by the data presented here; they will be discussed in general further in Chapter 7.

5.2 Methods and analysis

The results presented in this Chapter come from a range of complementary approaches, incorporating both quantitative and qualitative methodology (detailed in Chapter 3). In order to know and understand the two ethnic groups (Beafada and Balanta) perception's towards the LCNP in terms of costs and benefits, I use a combination of: i) survey questionnaires (N=258); ii) in-depth interviews (N=40 men); iii) six focus-groups (N=62 women); iv) in-depth interviews to Park guards (N=7); and, v) non-participant observation. All of these data were collected during a period of six months over three years (see Chapter 3).

Here I use these methods to examine how the livelihoods costs of the Park affect local peoples' perceptions of the opportunity and economic costs due to the Park, and any benefits of living within the protected area. I constructed networks (using ATLAS.ti) of the statements associated with costs in relation to the restrictions imposed by the Park, and then assessed how these restrictions influence perceptions of the Park. In the construction of the networks, I chose two terms, the LCNP itself and crop-raiding, to center the networks and therefore

qualitatively identify how these two "costs" structures the perceptual networks among men and women and between the two ethnic groups.

Results are presented by ethnic group and by gender throughout the Chapter in order to closely examine similarities and highlight differences.

5.3 Results

5.3.1 Conservation-related restrictions on the LCNP

The majority of the Guinea-Bissau population is highly dependent on natural resource extraction, such as fish and shellfish, palm tree products, firewood and charcoal, straw, fruits and many other wild products such as African fan palm to build houses or to use as medicinal plants. Guinea-Bissau has higher resource exploitation and degradation rates than neighbouring countries. Although the populations of these same countries sometimes "invade" Guinea-Bissau for resources, the biggest threats are mainly internal ones (IBAP, 2007).

5.3.1.1 Restrictions associated with the LCNP formation

LCNP faces enormous challenges regarding conservation of its remarkable biodiversity. Since its establishment, LCNP imposed a new set of rules that people are suppose to follow. A group of seven guards was created and these are responsible for the Park's protection, implementation of the rules and local awareness of the Park's role in natural resource conservation.

Regarding biodiversity conservation, LCNP has enormous difficulties such as: 1) deforestation and fires in order to prepare the agricultural fields (particularly rain-fed rice); 2) hunting bushmeat for trade, conducted by people who live inside the Park and by people from outside who sell the bushmeat in big cities (Bissau, Quebo and other cities – see Casanova & Sousa, 2007; Starin, 2010); 3) over-fishing at Cufada lagoons and Grande de Buba River; 4) exploitation of non-timber forest products (NTFP) and timber extraction (particularly African fan palm, palm trees and Kapok trees (called "poilão" in Guinea-Bissau), among other majestic trees); and, 5) growing of cashew plantations which can have negative environmental impacts (IBAP, 2007).

5.3.1.1.1 Restrictions associated with agriculture

Regarding agriculture regulations and the Park, local inhabitants who live inside the LCNP are not forbidden from growing their rice crops and others (cashew, fruits, peanuts, potatoes, tomatoes, cassava), but only in specific areas inside the Park. However, cropping inside the LCNP by people who do not live there is forbidden. Local inhabitants deforest areas inside the LCNP mainly to establish their agricultural fields; mostly these are the ones who rely on the *mpanpan* (slash-and-burn before the cultivation of dry rice). Since LCNP formation, local people have to ask the guards for permission to conduct forest clearings, which are allowed only in disturbed or secondary forests. Furthermore, according with the Park guards, agricultural fields much change location every year because the rice fields must rest for around 9 years. Meanwhile, people are allowed to grow other crops in the resting fields such as beans, corn, peanuts and others.

LCNP is located between rivers and lagoons and there are no restrictions on where to conduct *mpanpan* or areas to grow cashews. Thus, during the community sessions for local conservation awareness guards usually explain the rules that villagers must take into account when choosing a field site to grow a specific crop. Local people used to grow their cash crops in the same field as their rice crops; however, cashew plantations alter the soil composition completely and after that it becomes impossible to grow any other crops. Presently, some cash crops are planted in savannas or near people's houses, however some local inhabitants continue to plant in rice fields (after harvesting) instead of letting these rest for future rice growing.

5.3.1.1.2 Restrictions associated with hunting

The Park has hunting rules and a few biodiversity conservation actions taking place near local communities. An Official Hunting Regulation document exists, however it has not been applied in the LCNP, because it is waiting for legislative approval. When guards catch hunters, from inside or outside the Park, carrying meat during the rainy season (when hunting is forbidden even inside the LCNP) or with more meat than the number allowed of animals for each hunter (one), they confiscate the weapon and the meat is delivered to schools or given to the police or military (possibly fuelling further local demand). However, no fine can be applied since the Park's regulations have not been yet approved.

Hunters are allowed to hunt during the dry season (from November until April) but forbidden during the rainy season (from May until October), because animals are considered to reproduce during the rains. During the period of legal hunting, families living inside the Park are allowed to hunt animals for personal consumption, but the hunter can only take one animal at the time and animals of gazelle size or smaller. Chimpanzees and other non-human primates are included in the animals restricted to hunt and trade in bushmeat is illegal all year. If the hunter hunts a larger animal, for instance a gazelle, and his family it is not going to eat all the animal, they can sell a piece of that meat in their own village area (never outside the Park) and for the Park´s predetermined price of 1kg=500cfas.

5.3.1.1.3 Restrictions associated with fishing

Over-fishing is a problem, both in the freshwater Lagoons (e.g. Cufada Lagoon) and in Grande de Buba River (IBAP, 2007). Similar to hunting rules, fishing during reproductive period is also forbidden. Although there are some controls, an excess use of gill nets is made by fishermen, which has an enormous impact on the capture of other protected animals besides fish, such as manatees or turtles. Thus, it is necessary to regulate fishing activities in the Cufada Lagoon and in the Grande de Buba River.

5.3.1.1.4 Restrictions on timber extraction

Before the implementation of the LCNP, people used to obtain money from the selling of construction wood (African fan palm in particularly), but after LCNP formation, such activity became illegal. Timber extraction is a problem that has been controlled with some success in the recent years; however, the pressure remains, particularly through the river access to the Park, which allows for the illegal extraction of African fan palm and palm trees (IBAP, 2007). Inside LCNP villagers continued to use these trees (African fan palm), particularly for house materials, but only a certain quantity per year is allowed to be cut (only enough for house construction).

5.3.1.2 Perceptions of costs of the LCNP formation by local inhabitants

5.3.1.2.1 Beafada men

According to Beafada men (Figure 5.1), the Park allows them to grow their rice (mostly *mpanpan*) and cash crops, the main sources of food and income for the Beafada, respectively. The forest thus continues to be associated with food, water, shelter and source of income for the villagers. They grown their crops inside the forest and rely on their farms to

guarantee food and income for their families. However, according to Beafada men's testimonies, food has become a problem, particularly in some periods of the year (e.g. "Villager's difficulties" – see network provided). With the implementation of the Park some rules were imposed, such as hunting rules, as previously mentioned (e.g. "Park rules", "forest guards", "Park guards"). People were not allowed to hunt as they had in the past, but because fewer animals exist in the area, animals are harder to find ("wildlife", "preservation"). The men clearly recognise both the costs of the Park and some livelihood benefits from the forest (and its loss).

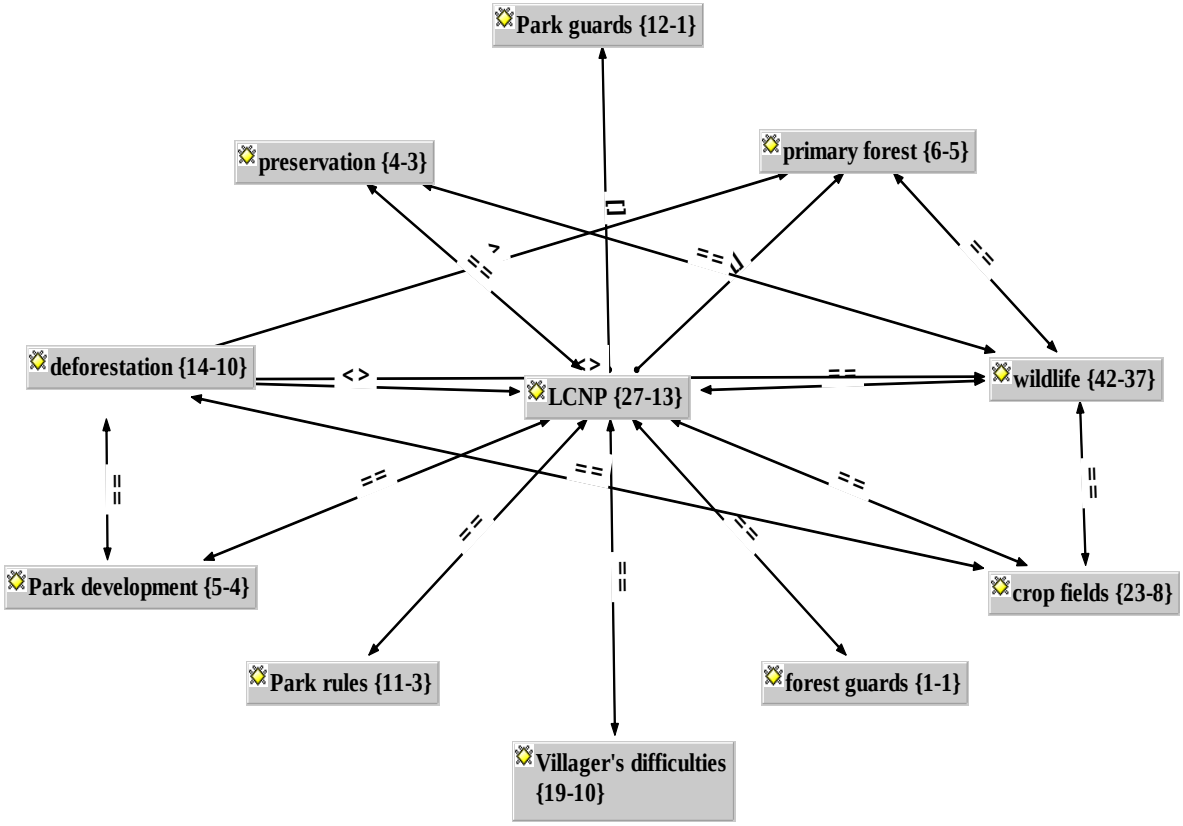


Figure 5.1: "LCNP" network according to the perception of Beafada men (N = 20).

Bushmeat was negatively associated with the Park, due to restrictions on hunting and trade. These may cause some difficulties for men who used to rely on hunting and bushmeat trade as an important source of income to buy rice and other necessary products. Furthermore, the rice from their crops fields was seen as diminishing over time due to crop-raiders such as monkeys (patas monkeys, green monkeys and baboons) and cane rats in particular.

Once the new hunting rules stopped people from killing monkeys, crop-raiding (see Figure 5.2 and Chapter 6) became central to perceptions of major constraints on people's livelihoods, and was associated with famine (due to the failure of rice crops which was attributed to increased crop-raiding). What is interesting is that while deforestation was recognised in the context of the Park and that this affected the number of wild animals (Figure 5.1), the increase in crop-raiding in people's fields was not perceptually linked with the loss of natural foods for wildlife, or monkeys in particular. The monkeys may represent dynamics in the forest that are seen to have gone awry.

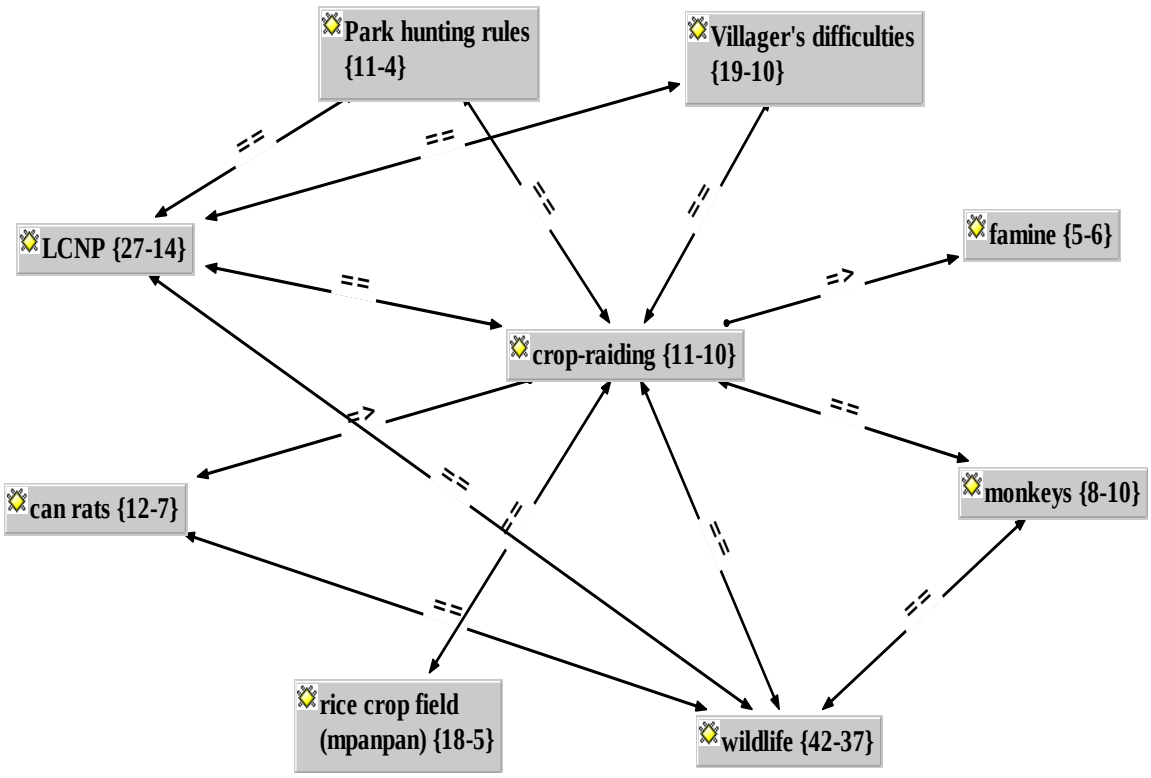


Figure 5.2: "Crop-raiding" network according to the perception of Beafada men (N = 20).

I think that in the past there were more animals, but they did not appear as much in our crops to destroy them. In our days, there are definitely less animals than used to be in the past; however, it is much harder for us to get our rice because animals, such as monkeys and cane rats, appear and destroy it. Before, hunters killed animals in the crops, now it is forbidden so they show up and destroy things.

(Beafada man from Bacar-Conté village)

5.3.1.2.2 Balanta men

Balanta men as well as the Beafada recognized the importance of the LCNP for animal and forest preservation. However, they also mentioned that the establishment of the Park brought little improvement to people's livelihoods. Once again, the word "Park" appears associated to villagers' difficulties (Figure 5.3). Although they recognized the improvements made by the Park related to some infrastructures, such as schools and support given to micro projects (see section 5.3.2), restrictions on hunting and the increased number of animals in the crop fields - crop-raiding (Figure 5.4) - has become a high source of concern for them too.

In the past, there were more professional hunters. Now there are mostly amateurs. However, there are hunters that continue to come from outside the Park to hunt in quantity for sale. These hunters seem to be military because of their weaponry. They bring a car with a fridge to conserve the hunted animals and take them to sell outside the Park. They hunt all the animals.

(Balanta man from Faraná village)

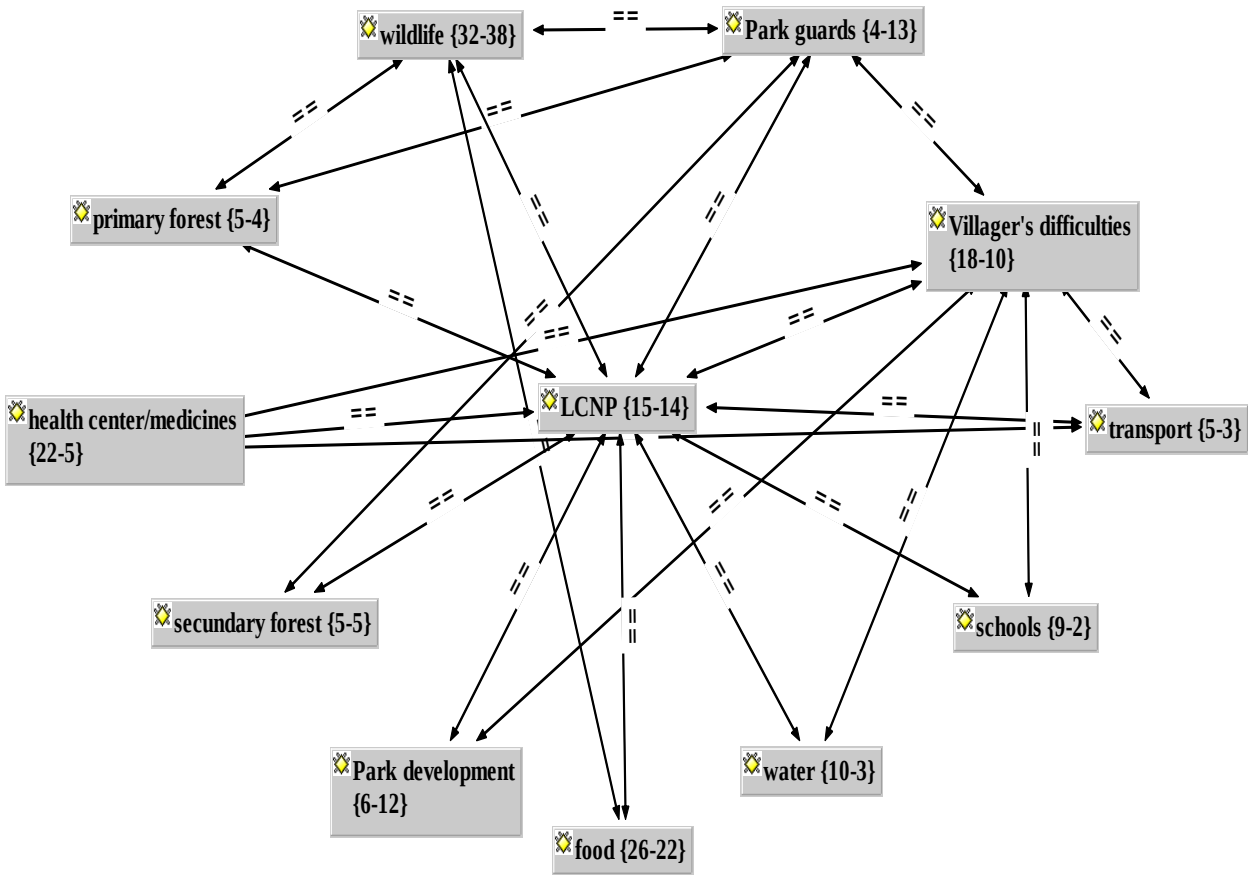


Figure 5.3: "LCNP" network according to the perception of Balanta men (N = 20).

Now there are fewer animals than before, but the animals now are worst, such as: cane rats, pigs or monkeys. In the past, they did not destroy our crops as much as in our days. Now it looks like they have crop-raiding strategies.

(Balanta man from Ponta Nova village)

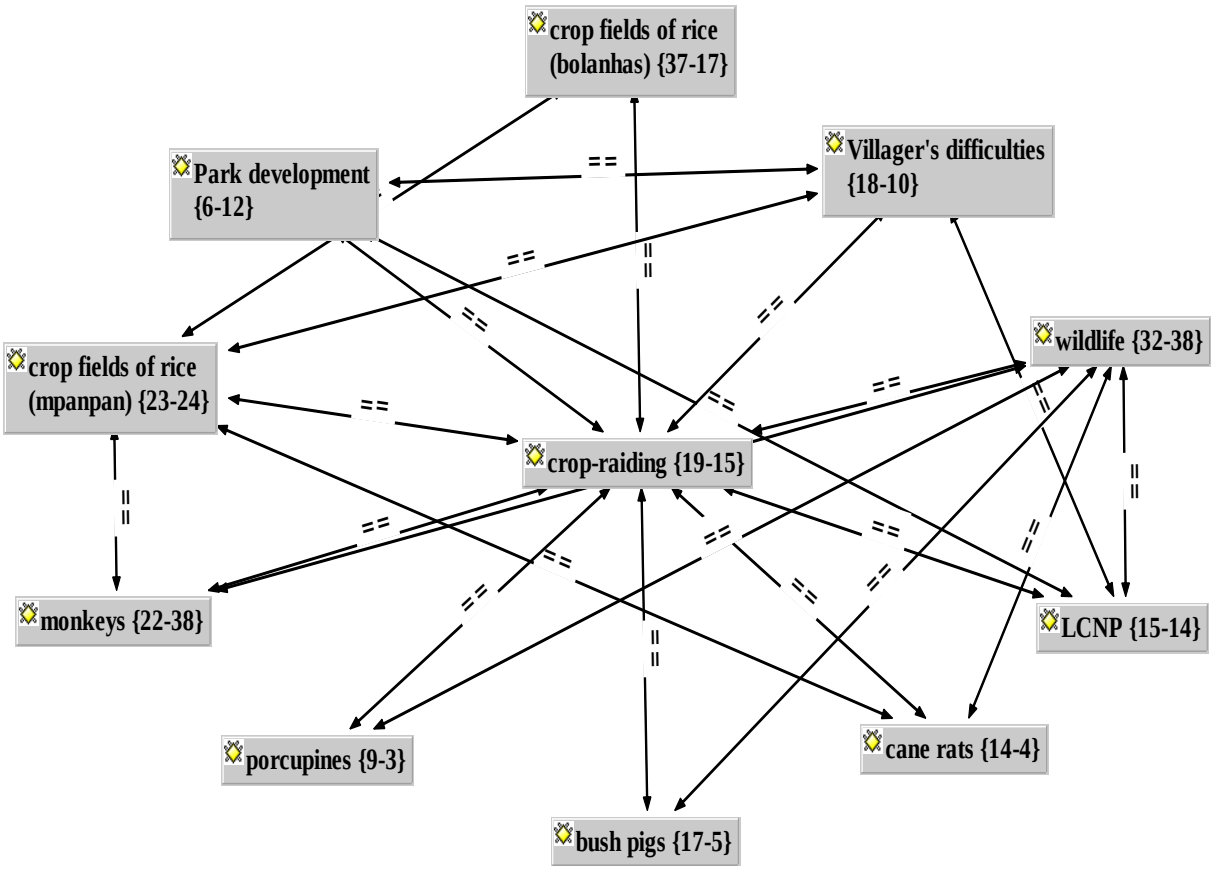


Figure 5.4: "Crop-raiding" network according to the perception of Balanta men (N = 20).

Although both Beafada and Balanta men realized the importance of the Park for the preservation of natural resources and even agreed with this construct, they felt that they do not have alternatives to deforestation and their hunting activities. They stated a need to continue to do both.

I think that animals could disappear if people continue to hunt them. But, if people stop hunting them what we are going to eat? At the moment we do not have another option. We know that both deforestation and hunting are bad for the Park, but we do not have alternatives.

(Balanta man from Gã-mela village)

I think that there are fewer animals now than before because of the hunters. It is possible that animals continue to exist if people stop hunting them, but for that to happen the Park needs to help us more.

(Beafada man from Bubatumbo Antiga village)

In general, men from both ethnic groups highlighted the importance of the LCNP formation for the animals and forest preservation. According to data from in-depth interviews (N= 40), Beafada men (90%) as well as Balanta men (85%) agreed on the fact that presently the number of animals in the LCNP is much smaller than it used to be about 15 years ago, so the Park's structure and rules may help increasing this number.

5.3.1.2.3 Beafada women

In general, women from both ethnic groups had more negative perspectives about the Park than did men. While Beafada men highlighted the importance of the Park in terms of wildlife and forest preservation, women only mentioned the problems that this protected area had brought into their lives and that they seem very far from being solved (Figure 5.5).

We have a lot of difficulties because we cannot have the same things that we used to have in the past. We have plenty of animals and wood inside the Park, but because it is a protected area we do not have access to anything. No one helps us. They said that the Park will bring rain, but for what do we want rain if we do not have anything else?

(Beafada woman from women focus-group in Bubatchingué village)

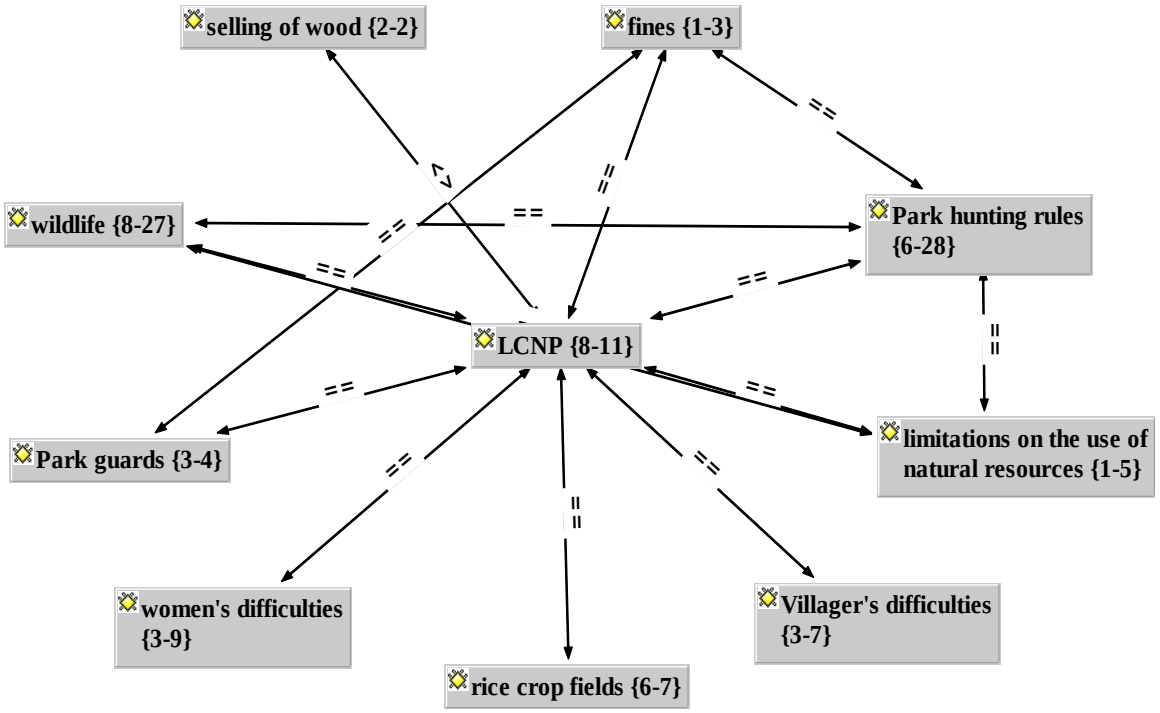


Figure 5.5: "LCNP" network according to the perception of Beafada women (3 focus-groups, N = 37).

Women stated that with the perceived increase in animals raiding their crops plus the hunting rules, which are seen as restricting the removal of crop-raiders, the damage was extreme and costly. Women suggested that there was a causal relationship between increasing wildlife and the increase in crop-raiding (Figure 5.6), but that this association would not be a problem if the authorities compensated them for crop losses. For them the crop-raiding is a problem mostly at night when the fields cannot be monitored (rodents such as the cane rat crop-raid at night).

Animals destroy many of our crops. Monkeys, pigs and birds are the worst ones. Our children watch the field during the day, but during the night no one can control the animals. What should we do?

(Beafada woman from women focus-group in Indjassen village)

We cannot refuse the Park, but it would be much easier to accept it if they help us more, like in other countries with protected areas. They have forbidden us from eating what we used to eat, like animals from the bush or fish from the lagoon. In the past we used to grow peanuts, but now we cannot because monkeys eat them all. There are a lot of monkeys in the Park and we feel very tired…

(Beafada woman from women focus-group in Bacar-Conté village)

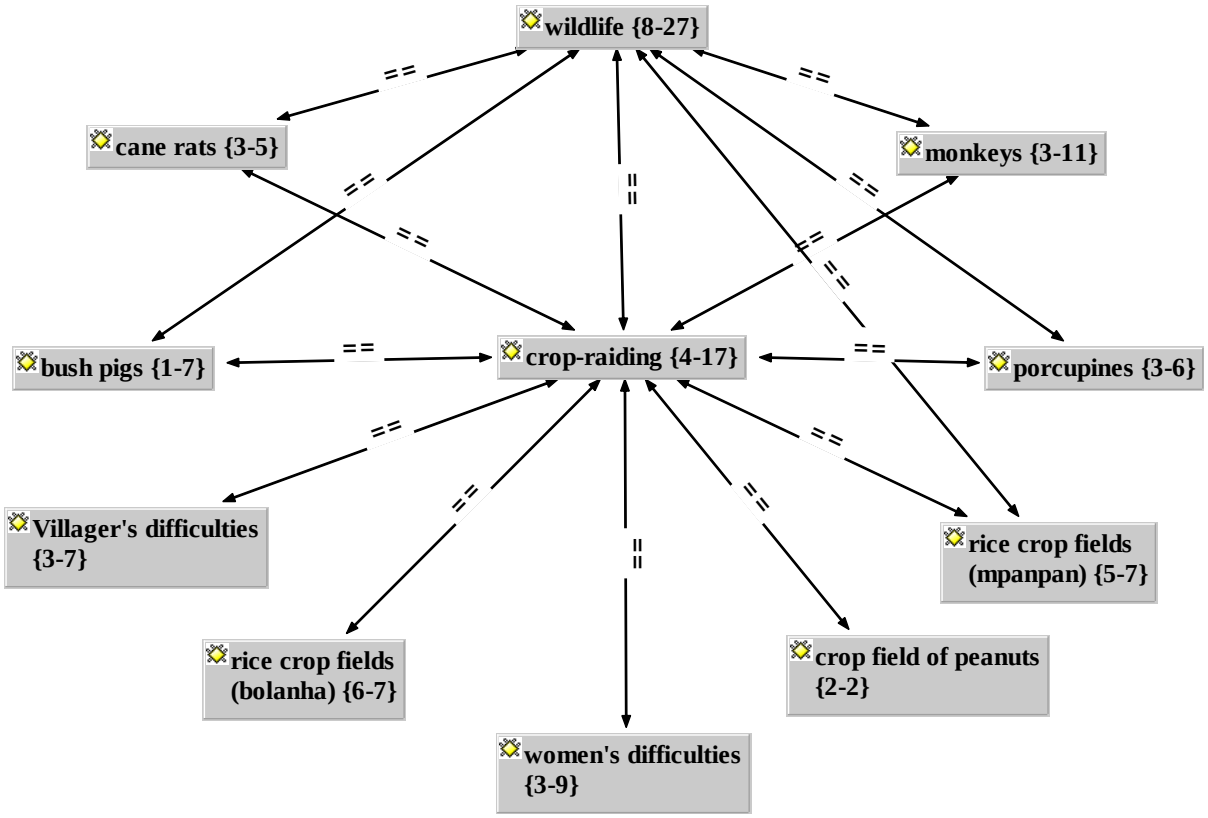


Figure 5.6: "Crop-raiding" network according to the perception of Beafada women (3 focus-groups, N = 37).

5.3.1.2.4 Balanta women

As mentioned above, women expressed more negative perceptions of the Park than did men. Although Balanta women also hold negative perceptions towards the Park, they seem to hold more positive values about it then did Beafada women. When I questioned them regarding Park's implementation (Figure 5.7) women firstly mentioned the problems that this protected area has brought in their daily lives as well as the fact that these problems seem very far from being solved. However, Balanta women also expressed hopeful opinions regarding the future of the Park.

We cannot say that the protected area is bad, but we hope that someone help us. For now we are waiting to see what is going to happen.

(Balanta woman from women focus-group in Gã-turé village)

We are used to living in here, apart from the problems that we have with the animals (crop-raiding), we enjoy living here.

(Balanta women from women focus-group in Nbindé village)

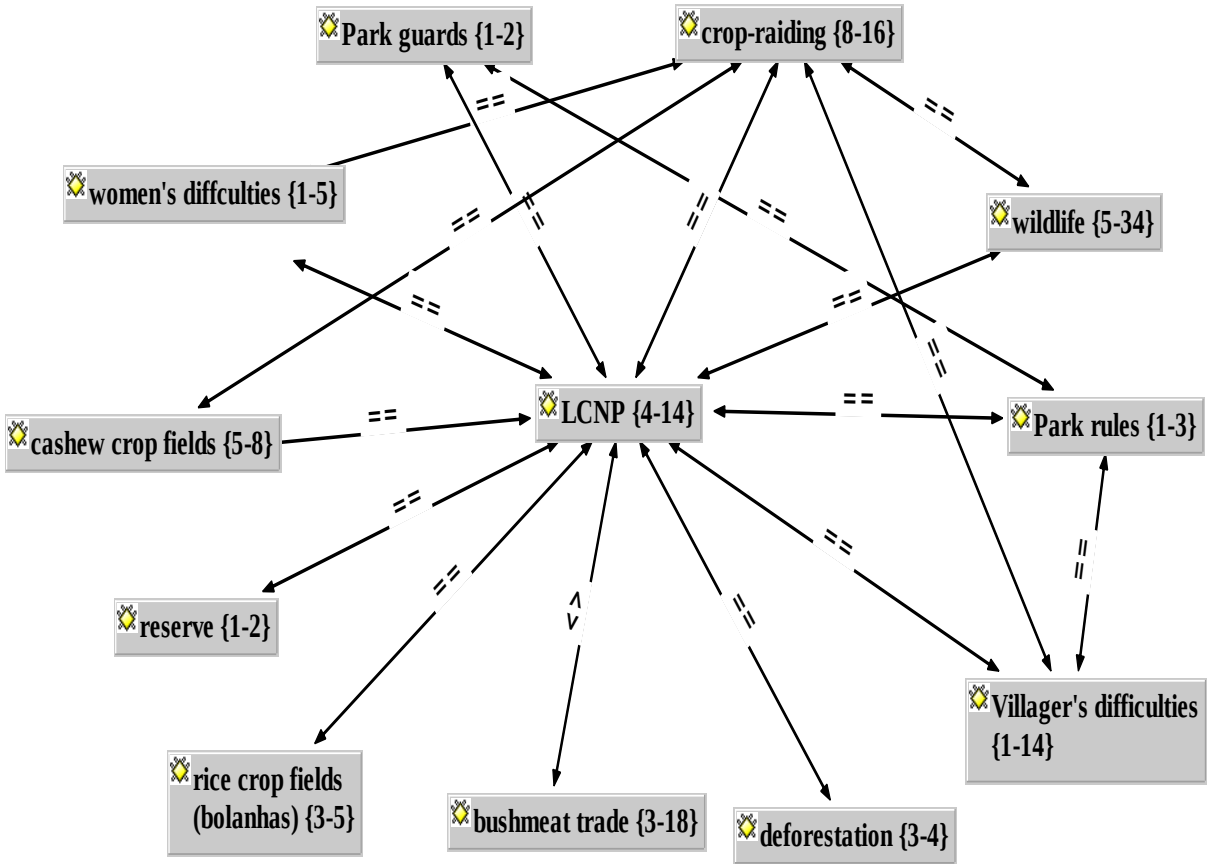


Figure 5.7: "LCNP" network according to the perception of Balanta women (3 focus-groups, N=25 women).

Like the Beafada women, the Balanta women also felt caught in a situation where they remain dependent on forest resources but can no longer exploit them and do not see any solutions to these problems. They also complained about a perceived increase of animals in their crops. Again, when the crop-raiding network was constructed, they identified the new hunting rules as restricting them from killing animals in their crop fields, so from their perspective the damages are unlimited (Figure 5.8).

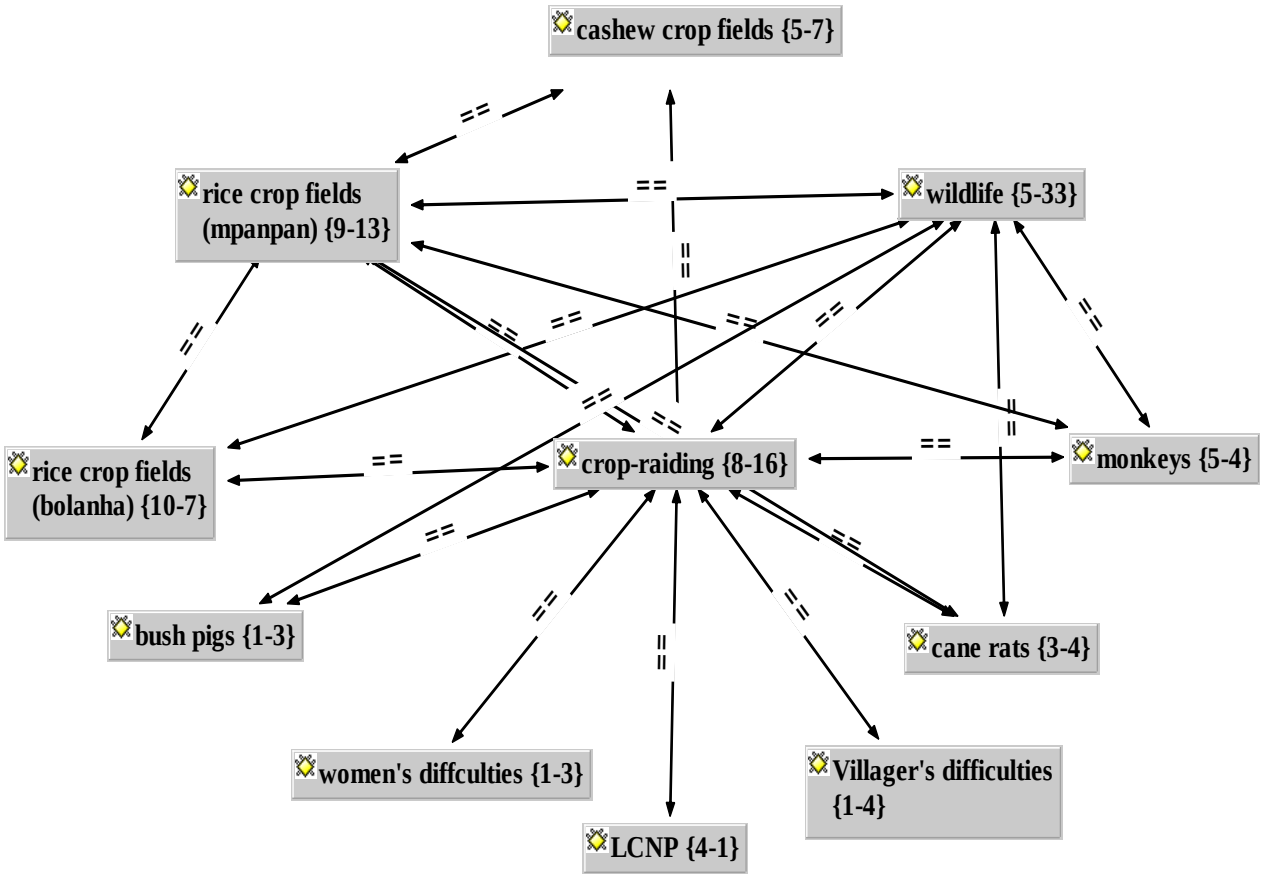


Figure 5.8: "Crop-raiding" network according to the perception of Balanta women (3 focus-groups, N = 25).

We have a lot of rice that comes from our bolanhas, but the animals destroy a big part of it and what I would like to do is to kill them all. Now there are plenty of them and they know that we cannot kill them. We are afraid of killing them because we do not want problems with the Park.

(Balanta woman from women focus-group in Nbindé village)

5.3.1.3 Perceptions on costs for hunting and bushmeat trade by local inhabitants

LCNP forest is relied on by all ethnic groups to extract a wide range of resources, such as meat, vegetable products where traditional medicines can be found, materials to build houses, wood to cook, crops, among others. Families living inside the Park are allowed by the Park legislation to hunt animals only for household consumption and only a single animal at a time. It is illegal to hunt for trade. Non-human primates (chimpanzees included) are also illegal to hunt. The perceived impact on people's livelihoods was clear, particularly for those who have traditionally relied on the forest to provide almost all their nutritional needs in addition to producing income through bushmeat trade, as was the case for both ethnic groups (especially in the case of Beafada while the Balanta now derive income from large-scale cashew plantations; see Chapter 4). Balanta normally do not eat domestic animals and are not

professional hunters as are the Beafada men, who depend more on the hunting as a source of income. Nevertheless, Balanta do buy meat from these hunters because Beafada men hunt more frequently and provide meat in larger quantities.

According to villagers, there were more Beafada hunters (98,4%) than Balanta [(71,3%) see Figure 5.9] and, this difference was statistically significative (χ^2=37.0; p <0.001). Bushmeat happens inside the Park as a way of generate income or as a trading mechanism and in general was associated with "money", "meat price" and "bushmeat trade" (Figures 5.10 to 5.14).

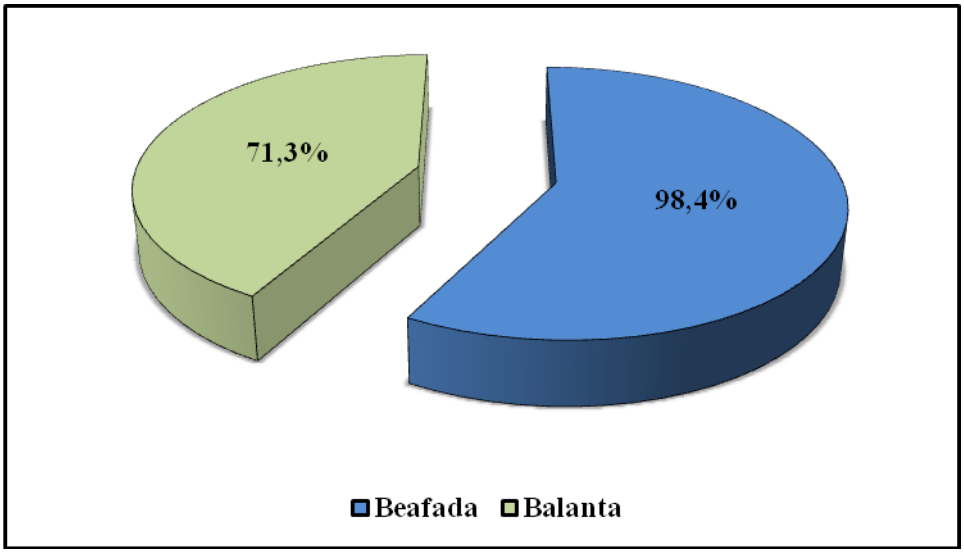


Figure 5.9: Results from the Yes answer to the question: *Are there any hunters in this village?* from the survey questionnaires (N=258).

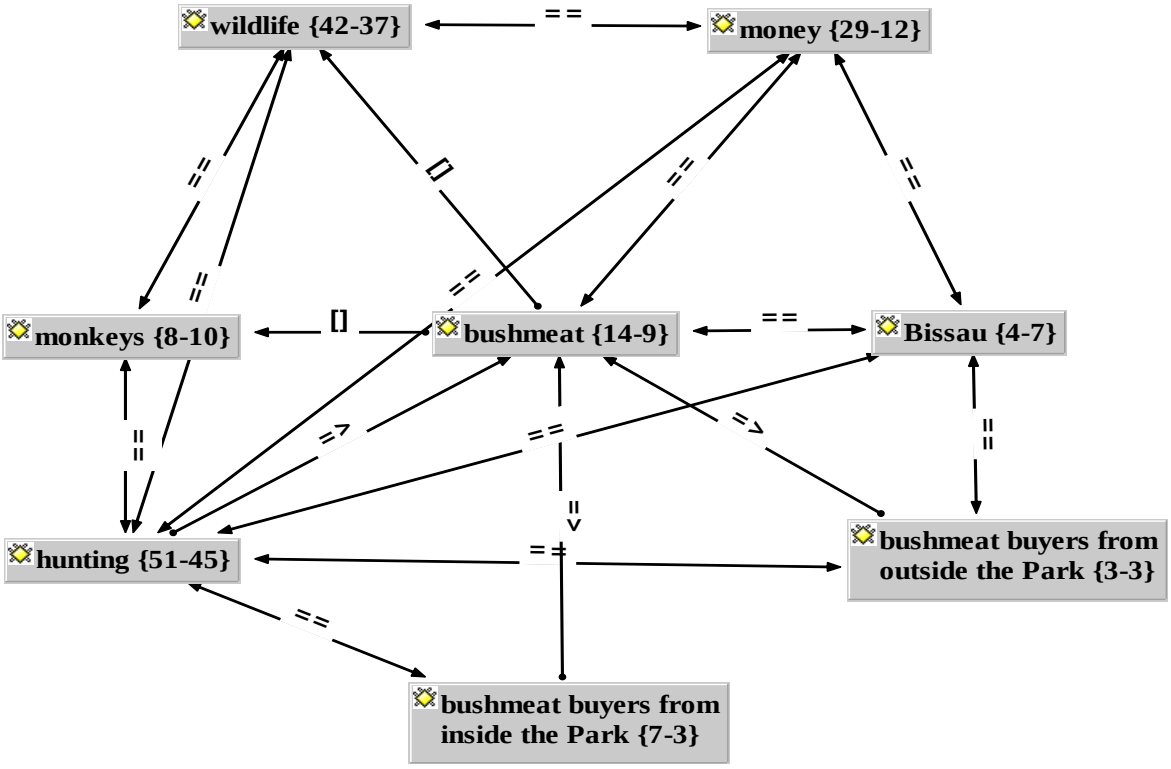
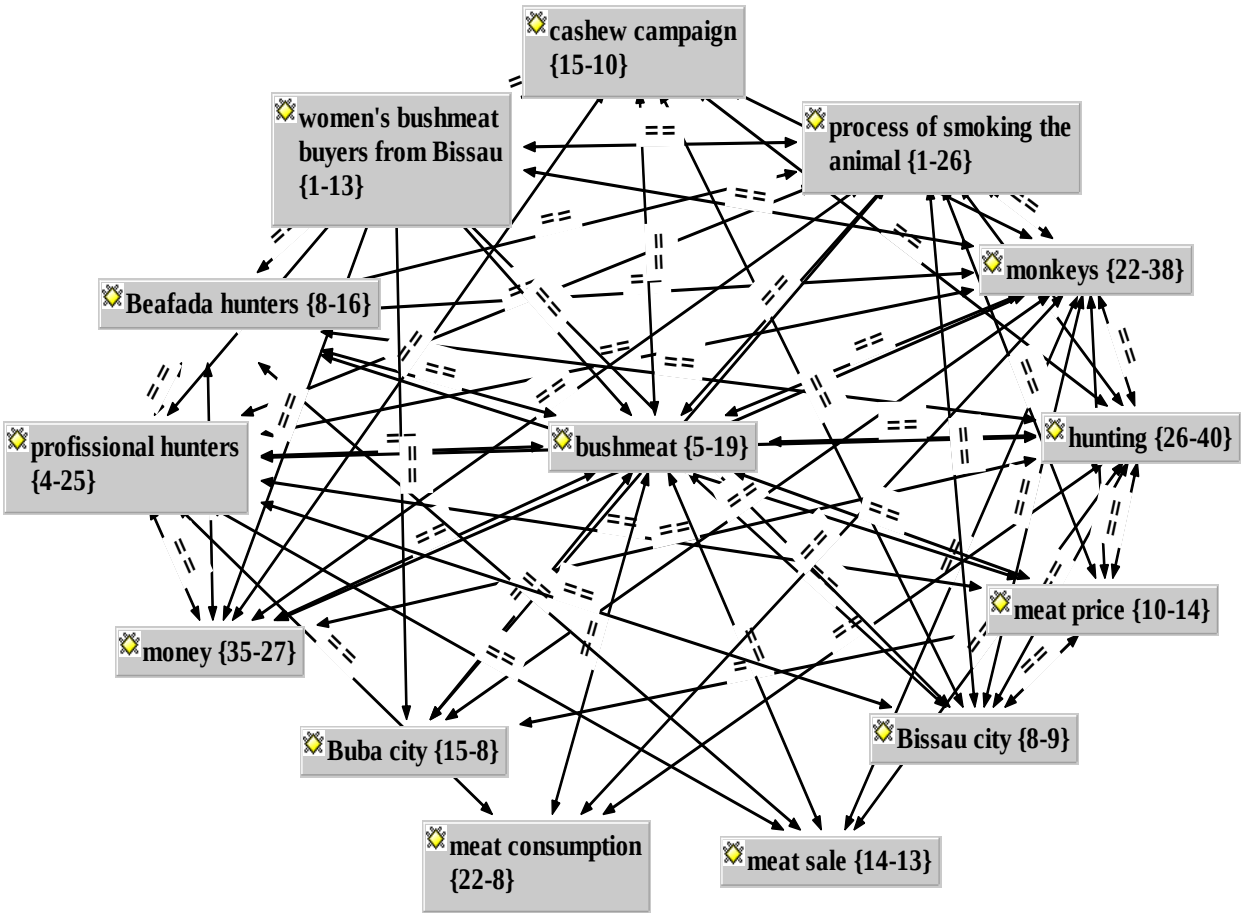


Figure 5.10: "Bushmeat" network according to the perception of Beafada men (N=20).



5.11: "Bushmeat" network according to the perception of Balanta men (N=20).

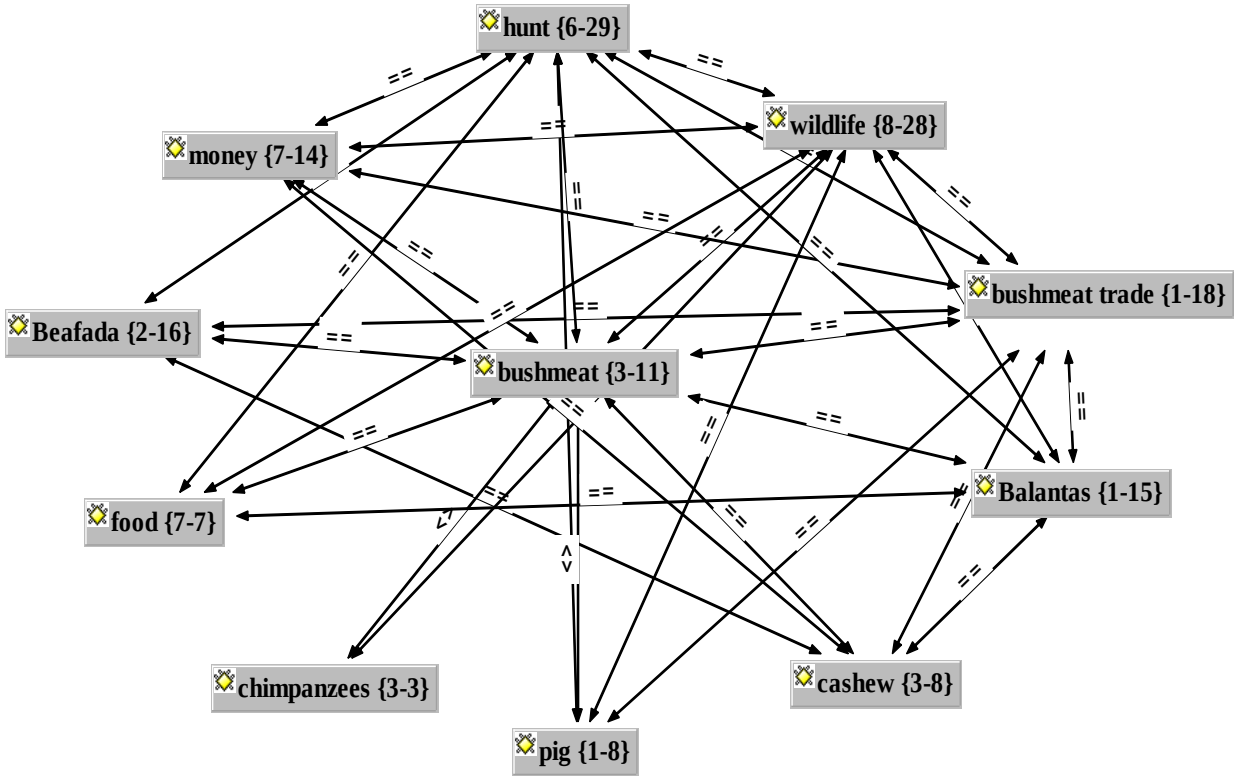


Figure 5.12: "Bushmeat" network according to the perception of Beafada women (3 Focus-groups; N=37).

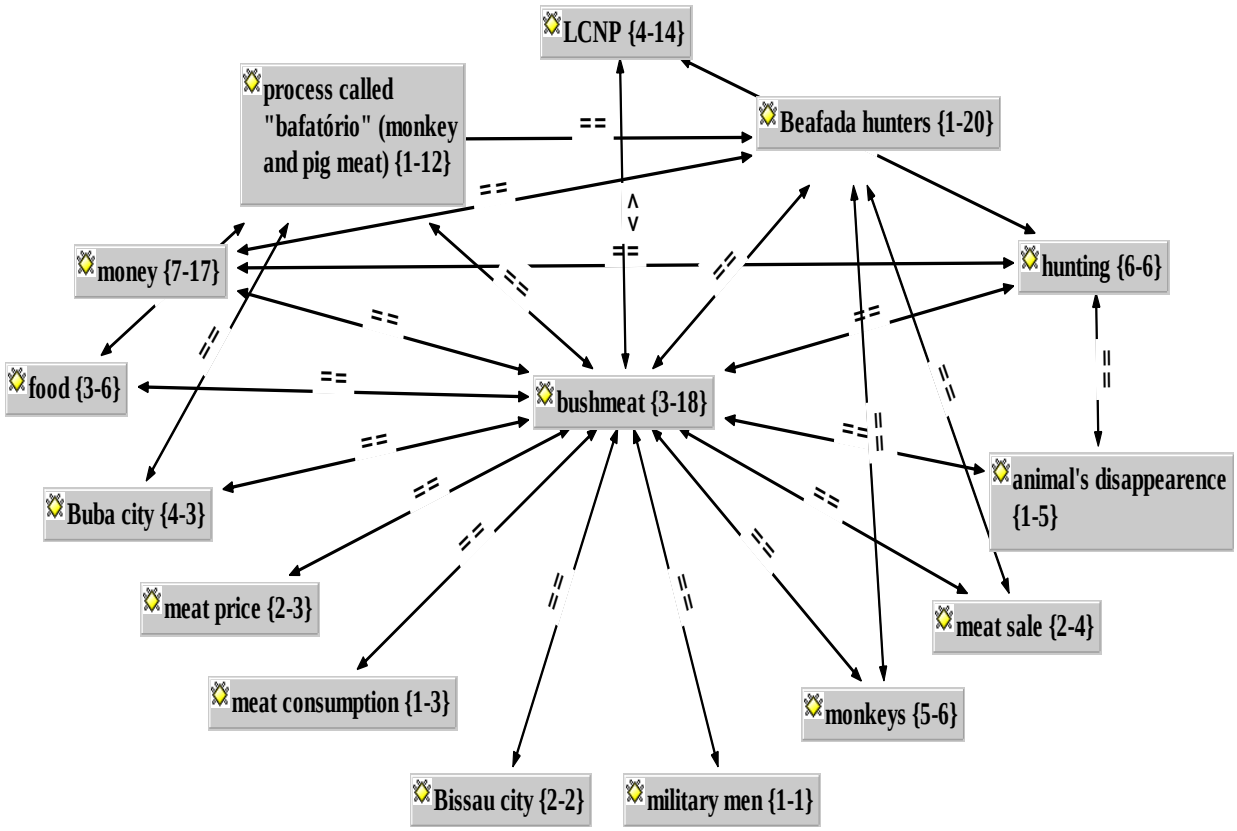


Figure 5.13: "Bushmeat" network according to the perception of Balanta women (3 Focus-groups; N=25).

In general, animals associated with bushmeat were often monkeys and pigs (edible), or chimpanzees (as an example of non-bushmeat), along with others animals (Figures 5.10 to 5.14). During the interviews Balanta respondents were asked if they buy and from whom they buy meat such as monkeys and pigs, because as non-Muslims they have no food restrictions. They explained that, although the Beafada do not eat monkeys or pigs due to their religion, they hunted these animals for sale (see Chapter 6). Balanta villagers, both men and women, also mentioned that in their opinion Beafada hunters should not ask for money in exchange for these animals, because if their religion does not allow them to eat this type of meat, it should also be forbidden for them to earn money from these animals to buy food for their families.

They (Beafada) say that they do not eat monkeys or pigs, but we think they eat, because the money from their meat sale is for them to buy food. They should offer the meat to us.

(Balanta woman from women focus-group in Nhala village)

The majority of hunters are Beafada. Balanta consume more meat because they do not have restrictions, they are not like the Beafada who do not eat pigs and monkeys because of their religion. However, Beafada hunt pigs and monkeys to sell to Balanta people in exchange for money.

(Park guard interview)

There is a lack of baseline data on pre-Park and post-Park exploitation levels of bushmeat, which makes difficult to quantify the impact of conservation measures on extraction levels. However, both ethnic groups were unanimous in saying that around five years before Park's implementation there were many wild animals, but unfortunately they were intensely hunted by professional hunters for trade, so they began to disappear. After Park's establishment, many hunters have emerged, particularly in the Balanta, as amateurs who hunt primarily for personal consumption and use mainly dogs (more "traditional" techniques) and are not so dependent on guns (compared to the Beafada who are sometimes heavily armed). According to people's testimonies, wild animals are less abundant, but they now constantly appear in their crops fields (see above).

It seems important to differentiate the roles of each ethnic group in the bushmeat trade, for instance in terms of hunters and/or consumers. The distinction between "amateur" or professional hunters seems debatable in the networks. In particular, Balanta men and women (Figures 5.11 and 5.14) associated bushmeat with Beafada hunters describing them as professional hunters. Learning how to be a professional hunter was part of the Beafada and Fula ethnic groups' culture (Imbali, 1997; Temudo, 2006, 2009).

The main cost of the implementation of LCNP appears to be the loss of freedom regarding the killing of wild animals – either access to bushmeat meat whether for consumption or income, or changes in killing as a way of managing monkey crop-pests. The importance of these issues was underlined in the interviews conducted with both men and women from both ethnic groups, and was apparent in all the networks discussed above.

Hunting now is difficult, we hunt for food and if we want to sell a piece of meat we can sell it, but in our village area. For this reason animals appear on our crop fields and destroy them because hunters cannot hunt them. I see a lot of monkeys.

(Beafada man from Lamane village)

I do not hunt. I am afraid of guns, but I buy meat from the Beafada and Fula hunters, all meat, but they mostly sell cane rats and monkeys. It is the same price for each kg, however if the monkey is bigger the price is higher. Chimpanzees never appear for sale, because they look like us.

(Balanta man from Gã-mela village)

According to Park guards' in-depth interviews, the rainy season (when hunting is not allowed) is the period when more hunters from outside the Park come to hunt for bushmeat trade. Usually during this period the rice from *mpanpan* or from *bolanha* is not ready for consumption and the cashew-nut sale is ending, so hunters need to hunt bushmeat for sale to get money to buy rice.

Nowadays is difficult to have meat because of the Park rules regarding hunting, but we sell bushmeat anyway. We hide the meat from the Park and forest guards. We sell it in Buba and Bissau. We go to Bissau by canoe so we can hardly be caught by the Park or forest guards.

(Beafada man from Bubatumbo Antiga village)

Most of the professional hunters are Beafada. They hunt more than us because they are professional and we are amateurs – we are still learning. I am an amateur hunter, who hunts especially to protect the cattle from dangerous animals. It is easier to hunt during the rainy season and is when hunters most hunt, although it is forbidden by the Park.

(Balanta man from Faraná village)

According to the Balanta and Park guards' perceptions, baboons were the animals most hunted by Beafada and others (professional hunters), because they are bigger (10-15 kg) than other monkeys (4-5 kg). Cashew-nut harvest was the period when more NHP were hunted. Women from Bissau named "bideiras" (Cá, 2008; Ferreira da Silva, 2012) come into the Park to buy NHP bushmeat to increase their business in Bissau (they exchange money, cigarettes or bullets for bushmeat). If for instance, Balanta people do not have money to buy baboons, they remove the interior of the animal to eat while Beafada take the carcasses to sell in Bissau. One of the Park guards' explained that this meat is hidden for them to get to Bissau by sea. According to the statements of Park guards (N=7) monkeys are easy to hunt because they live in groups and most of the time hunters hunt them while they are asleep. Baboons, however, besides living in groups are, apart from the chimpanzees, the biggest primates inside the Park. In the bushmeat trade, bigger size means more money (Table 5.1).

Table 5.1: Bushmeat price list (values taken from a Beafada hunter interviewee).

Wild Animals[1]	Park (CFA)[2]		Buba (CFA)		Bissau (CFA)
	1 Kg[3]	Complete animal	1 Kg	Complete animal	
Gazelles	1000	30000	1250 to 1500	45000	Not taken
Duikers	1000	3000	1250	7000 to 8000	Not taken
Bush pigs	1000	3000	1000	3000	Not taken
Black pigs	350	1000	350	1000	Not taken
Porcupines	1000	3000	1250	7000 to 8000	Not taken
Red pigs	500	1500	750	2500	Not taken
	Complete monkey		**Complete monkey**		**Complete monkey**
Monkeys	1500 to 2000		2500		3500
Baboons	2500 to 5000		7500		30000 to 35000

[1] see Table of the Species named in this Thesis
[2] 1 US dollar =542 West African CFA franc (CFA)
[3] 1 Kg = 2.2 lb

5.3.2 Benefits-related Conservation

The benefits that a protected area such as the LCNP provided include both use and non-use of the forest and wildlife resources, each divided into current and future benefits.

5.3.2.1 Benefits associated with the LCNP formation

Bequest Value

Bequest value, or the value of leaving the protected area for the future generations, is a value highly concentrated on the potential for future use (Hodgkinson, 2009). As the previous analyses demonstrated, such value was recognized more by men than by women (section 5.3.1.1). However, lack of alternatives for people's habits that do not contribute for the forest preservation could turn this benefit into a cost for future generations.

Health

In terms of health infrastructures, these were scarce and ineffective and there are no resources available to improve them [see Chapter 4 (LCNP Coordinator, personal communication, 2011)].

Boreholes

IBAP was responsible for the construction of eight boreholes inside the Park's area. The other boreholes of unknown number were made by different NGOs (LCNP Coordinator, personal communication, 2011)].

Education

There were thirteen primary schools (from the 1th until the 4th year) within the Park's boundaries. These schools were constructed before the LCNP implementation in 2000. However, IBAP improved the infrastructure in each school [see Chapter 4 (LCNP Coordinator, personal communication, 2011)].

Development Micro-projects

Two development micro-projects have been in operation in the Park: 1) honey production in more sustainable way. The Local Fund for Environmental Initiative to the Villages (FIAL) offered beehives to any of the population interested, in order to avoid the traditional method involving burning trees and other honey-gathering activities responsible for deforestation. 2) Increase the raising and consumption of domestic animals (goats, chickens, pigs and cows) as an alternative to the bushmeat consumption and trade. The trade of these animals is limited by comparison with the bushmeat trade. Some livestock animals are more expensive than bushmeat, particularly if people sell them outside the Park's boundaries. However, only three villages within LCNP agreed to participate in the honey micro-project and only one to participate with the domestic animal project.

Alternative use

LCNP management would like to provide more opportunities for crops of paddy rice (*bolanhas*) instead of dry rice (*mpanpan*), so that deforestation could be prevented, but until the present no specific initiatives had been developed.

5.3.2.2 Perceptions of benefits of the LCNP formation by local inhabitants

Both Balanta and Beafada men recognized the importance of the implementation of the Park for animals and forest preservation, as illustrated in men's networks above. Although they also recognized the improvements made by the Park regarding some infrastructure, such as schools and the development of micro projects such as revenue generated by the sale of honey, the establishment of the Park brought little genuine improvement to people's livelihoods. Neither Balanta nor Beafada women recognize benefits from the Park.

People understand the importance of the Park, but when they are hungry they do not follow the rules. People know that the Park is important for them, because they receive things that they could not get from the government. The major difficulty of the Park is to arrange steadiness between what the Park wants and what the people inside the Park need.

(Park guard interviewed)

5.3.3 Guard's perception of the LCNP formation

LCNP has been guarded by a team of seven guards since its formation in 2000. The guards were selected from a group of local inhabitant's living inside the Park's area, based on their performance in a selective test. Some were previous hunters. According to Park guards' perceptions, people seem to accept the life inside the Park and believe that the forest and wildlife in it will continue to exist in the future with the contribution of all. However, all Park guards recognized major difficulties in accomplishing such goals. During the interviews Park guards were asked, among other topics, about their main concerns regarding Park's management as well as their solutions for the mentioned problems (Table 5.2).

Table 5.2: Main concerns and solutions of the guards regarding Park's management.

Park Guards Concerns	***Park Guards Solutions***
Deforestation	Improvement of the *bolanhas* (resources for the population such as: tractor)
Mpanpan crops fields	Improvement of the *bolanhas*
Cash crop fields	Importance in finding alternatives to the cash crops (less dependency)
Hunting	Increase of the number of guards/ Community collaboration/Livestock alternative
Buba and Fulacunda hunters (outside hunters)	Strengthen surveillance/Reinforcement of the law
Crop-raiding	No solution yet
Low number of guards	Increase the number of guards
Schedule: 8h – 16h	Increase the number of guards for the schedule: 16h – 8h
Bushmeat trade	Encouragement of livestock trade (economic alternative)
Lack of hunting control	Increase of the number of guards, transports and equipments

5.4 Discussion

LCNP attempts to protect biodiversity and simultaneously provide for peoples' livelihood and development needs. In order to fulfil this goal, the Park produces incentives – primarily economic - for local people to engage in pro-conservation behaviours, as well as, value and attitude change through environmental education implemented through meetings with the Park guards. In LCNP given the high level of reliance on forest resources by the local inhabitants, the formation of the Park has imposed considerable opportunity costs, notably reducing agriculture clearance, hunting access, with increasing crop-raiding consequences.

The economy of large areas of the West African rain-forest zone is based on relatively intense agriculture and/or the commercial exploitation of natural resources, including timber and bushmeat (Oates, 1999, 2002). The majority of the Guinea-Bissau population is highly dependent on resource extraction, products, firewood and charcoal, straw, fruits and many other wild products such as African fan palm to build houses or to use as medicinal plants. Deforestation and forest burning are linked to agricultural activities particularly to some ethnic groups (such as the Beafada). The alternative to the *mpanpan* rice crops (rain fed rice) is the *bolanha* type of rice cultivation, or paddy rice. However, not every village inside the

Park is located near wet and low land areas where it is possible to grow such rice crops fields (IBAP, 2007).

When considering the opportunity costs of restricting hunting, several points should be taken into account. Firstly, the high level of illegal hunting conducted inside the Park means that opportunity costs were not fully imposed. It was clear from the survey questionnaire results, but particularly from the in-depth interviews to both men and women and Park guards, that there is still a large amount of illegal hunting activity within the Park's boundaries. Although trade in bushmeat is an illegal activity, hunting for the trade happens inside the Park as a source of income. Bushmeat trade occurs especially along the main roads or by boat with Bissau as their destination (Cá, 2008; Casanova & Sousa, 2007; Gippoliti & Dell'Omo, 2003).

Bushmeat may be an important dietary component when agricultural products are scarce and households are most vulnerable in terms of food (Allebone-Webb, 2009; Chambers, 1997; de Merode et al., 2004; Nasi et al., 2008). Forbidding the trade in bushmeat may have caused some difficulties for households who were used to rely on this activity as an important source of income to buy rice and other products. Restrictions on hunting and the increased number of animals in the crop fields - crop-raiding - has thus become a source of major concerns for both ethnic groups (Beafada and Balanta). Once the new hunting rules stopped people from killing monkeys, crop-raiding became central to perceptions of major constraints on people's livelihoods.

Bushmeat appears to be more important as a source of income than as a source of food (de Merode et al., 2004; Kümpel, 2006; Nyahongo et al., 2009; Wilkie & Godoy, 2001). The impact on people's livelihoods was clear, particularly in the case of Beafada and mainly since large-scale cash crops have been implemented. Balanta normally do not eat domestic animals and are not professional hunters as are the Beafada men, who depend more on the hunting as a source of income. Nevertheless, Balanta do buy meat from these hunters because Beafada men hunt more frequently and in larger quantities.

Without understanding how particular restrictions are functioning and impacting on local communities, it is impossible to evaluate their effectiveness, particularly with regards to poverty alleviation (Hodgkinson, 2009). Pfeffer and co-workers (2006) suggested that the

inclusive National park model generates greater expectations of benefits on the part of local residents in an exclusionary *fortress* park model. The provision and support of community infrastructure such as schools and health centres within the LCNP can be considered to be a positive influence for livelihoods. However, since these are both indirect and long-term benefits, they did not appear to be associated with conservation efforts, particularly in light of their relatively small scale (Ferraro & Kiss, 2002; Wells & Brandon, 1992).

An attempt, albeit limited in scope and activities, to directly encourage alternative livelihoods to hunting or agriculture appears to have been largely unsuccessful. Considerable long-term benefits may still fail to compensate relatively small short-term costs (Casse et al., 2005). Benefits may also be provided in a form which individuals fail to value (Gibson & Marks, 1995). In general, women from both ethnic groups have more negative perspectives about the Park than do men. Women felt that they have more restrictions now than ever before and they do not perceive of any benefits from the formation of the Park. Although both Beafada and Balanta men realized the importance of the Park for the preservation of natural resources and even agreed with it, they also felt that they do not have alternatives for the deforestation and hunting activities.

According to people's testimonies (both ethnic groups and gender), wild animals seem to be less, but they constantly appear in their crops fields. Smaller-bodied pests, such as rodents (cane rats), bush pigs, primates and birds are those more responsible for most actual crop-damage (Gillingham & Lee, 2003). The same seems to happen in LCNP. Primates in particular pose severe problems as crop-raiders (Lee, 2010; Naughton-Treves et al., 1998; Newmark et al., 1994; Strum, 2010). Local people confirm this information, for them the worst crop-raiders are cane rats (rodents) and monkeys [patas monkeys, green monkeys, Campbell's monkeys and baboons in particularly (for more detailed information, see Chapter 6)]. For those primate species, which have been reduced to a few isolated populations due to human activities and anthropogenic habitat changes, there are only two options: (a) refuge areas large enough to accommodate their populations or, (b) enable primates to live alongside the human populations which occupy and exploit their habitats without direct hostile interactions (Lee, 2010; Priston et al., 2012).

5.5 Conclusions

This Chapter evaluated the costs and benefits associated with the formation of the Park for conservation purposes. This has resulted in significant opportunity costs for local communities, although when considering the opportunity costs of hunting, the continuation of illegal hunting within the Park boundaries has to be taken into account.

According to the networks produced here, differences in the reported perceptions of the local inhabitants towards the LCNP were more differentiated by gender (men and women) than by ethnicity (Beafada and Balanta). Local people felt caught in a situation where they remain dependent on forest resources, even while knowing that they can no longer exploit them; there are as yet no reliable alternatives to this dependency provided by the Park. These views highlight the need to consider the complexities and suitability of both the local population and development approaches when designing conservation projects.

Therefore, evaluating both NP and SC sides along multiple criteria could offer a more complete and sophisticated view of the costs and benefits of particular vehicles of conservation and development, and make clear the relative virtues and drawbacks of particular conservation strategies on the landscape (Miller, Minteer, & Malan, 2011).

Chapter 6

Perceptions of wildlife by local people

6.1 Introduction

In this Chapter I evaluate the reported perceptions and attitudes of the local inhabitants towards wildlife in the LCNP. Accessing local villagers' perceptions of wildlife was important for a better understanding of their attitudes towards wildlife in the Park. Negative or positive attitudes regarding wildlife may determine if there is the capacity for sustaining populations of wild animals within LCNP boundaries. Retaining wildlife can sometimes pose a challenge to conservation strategies that require the acceptance or even the contribution of the local people.

Perceptions and attitudes from local people regarding wildlife conservation in protected areas depend mostly of the impact of wild animals in terms of the damage caused to their crop fields and livestock (Hill & Wallace, 2012; Hill & Webber, 2010; Lee, 2010; Lee & Graham, 2006; Naughton-Treves et al., 1998; Newmark et al., 1994; Priston et al., 2012; Strum, 2010). In general, when attitudes towards animal's species that create damage or threaten people are measured, the willingness to protect animals more generally is reduced (Gillingham & Lee, 1999; Heinen & Low, 1992; Kaltenborn et al., 2006). The effectiveness of species conservation efforts depends upon perceptions of the species – to some extent the degree to which various wildlife species are liked or disliked, valued or devalued, or play a role in human existence (Kellert & Wilson, 1993).

Although all life-forms in some way influence human survival and the diversity of wild animal species used by humans is enormous, some species have more direct economic or social relevance in peoples' life than others (Garibaldi & Turner, 2004). Understanding people's attitudes and beliefs, as they are posited to influence human behavior is crucial (Ajzen & Fishbein, 1977), because with such knowledge managers should be better able to predict the response and support of local people to wildlife policies (Brownez-Nuñez & Jonker, 2008). According to Kaltenborn et al. (2006), it is important to understand more about why preferences for wildlife species vary greatly and how this influences wildlife management. These could be influenced by global attitudes like general preferences for certain flagship species (charismatic and popular animals like the giant panda *Aluropoda melanoleuca*, or the tiger *Panthera tigris*) or by specific experiences with animals and the problems they cause (Kaltenborn et al., 2006; Verissímo, MacMillan, & Smith, 2011).

Hostile human–wildlife interactions (euphemistically termed "conflict") are increasing across Africa, as human populations' demands for land and habitat degradation proliferate throughout the continent. Thus, human–wildlife conflict can be expected to continue to increase and less land will likely be available for parks and protected areas (Barnes, 1996; Madden, 2004; Tchamba, 1995). This so-called conflict often takes the form of crop-raiding by wild animals. A variety of vertebrate species are considered by local people as troublesome visitors to farmers' fields (Hill, 1997; Lee, 2010; Naughton-Treves et al., 1998; Newmark et al., 1994; Strum, 2010). Primates in particular pose severe problems as crop-raiders (Hill, 2000; Naughton-Treves et al., 1998; Newmark et al., 1994; Strum, 2010). Primates are known by their physical agility, co-operative behaviour (Hill, 2000) and cognitive ability to assess the risks and wait for a good opportunity to raid (Priston et al., 2012; Strum, 2010). Often the lack of compensations regarding the crop damage results in greater dissatisfaction with wildlife conservation (Gillingham & Lee, 1999; Hodgkinson, 2009; Lee & Priston, 2005; Paterson & Wallis, 2005; Webber et al., 2007). Primates are associated with a diversity of values from religious, family members (pets), pests and food (Hill & Webber, 2010; Lee & Priston, 2005).

In West and Central Africa, duikers, pigs, primates and rodents are the most commonly hunted groups of animals in the forest (Robinson & Bennett, 2002; Wilkie & Carpenter, 1999). Small-bodied rodents such as cane rats and porcupines are particularly important in Africa (Fa, Juste, Perez del Val, & Castroviejo, 1995), while carnivores tend to be minor constituents of human prey (Bowen-Jones et al., 2003). Primates account for an estimated 8–22 per cent of the bushmeat volume (Bowen-Jones & Pendry, 1999). Wildlife hunting for human consumption is critical for the livelihoods of many in West and Central Africa, especially the rural poor (Bowen-Jones et al., 2003), during the hungry season and in situations of stress and emergency (Dei, 1989; Chambers, 1997; de Merode et al., 2004, 2006; Pattanayak & Sills, 2001). Yet studies also demonstrate that bushmeat may be more important for income than for food, as over 90% of bushmeat and fish production is sold at markets (de Merode et al., 2004; Kümpel, 2006; Nyahongo et al., 2009; Wilkie & Godoy, 2001). This over-harvesting appears to be worsening for the wildlife populations that are hunted for bushmeat (Bowen-Jones et al., 2003), as many West Africa populations of large bodied wildlife species have already declined or been extirpated because of habitat loss and hunting (Bennett et al., 2002). In Guinea-Bissau, hunting of primate species is illegal; however, large quantities of primates are still hunted for the bushmeat trade (Cá, 2008; Casanova & Sousa,

2007; Gippoliti & Dell'Omo, 2003; Ferreira da Silva, 2012). Bushmeat trade occurs especially along the main roads or by boat with Bissau as their destination (Cá, 2008; Casanova & Sousa, 2007; Gippoliti & Dell'Omo, 2003).

Beside bushmeat for consumption and/or trade, wild animals have long been used by humans for diverse purposes. Other important uses include local people' needs for food, clothing, shelter, fuel, medicine, therapy, ornamentation, manufacturing of domestic tools and magic-religious symbolism (Alves & Rosa, 2008; Barros et al, 2011; Brooks, 1998; Ribeiro, Palha, Tourinho, Whiteman, & Silva, 2007; Sá, 2012). The different ways in which the wild animal resources are used by local villager cultures have become a significant object of research due to their overall importance to conservation issues (Berkes et al., 2000; Gadgil et al., 1993; Ohl-Schachener et al., 2007; Tejada, Chao, Gómez, Painter, & Wallace, 2006). All animal species have valuable ecological functions; however, perceptions of nature are structured by experiences, cultural norms and values and in some societies there is a hierarchy of ranked values attributed to living organisms (Arluke & Saunders, 1996; Jacobs, 2012; Kellert, 1996; Kellert & Wilson, 1993). Arluke and Sanders's research (Arluke, 2001, 2003; Arluke & Sanders, 1996) is often based in the unconscious way societies threat the animals. The building of socio-zoological scales has the purpose of separating culturally salient "others" into "good" and "bad" animals, allowing people to treat the first ones with respect and affection, and the others with indifference or even cruelty. However, these constructs are flexible enough for a "good" animal to quickly become a "bad" one (Arluke & Sanders, 1996).

There has been growing international recognition that traditional and local ecological knowledge can provide useful insights into the economic or social values attached to wild species to complement *western scientific* approaches (Berkes et al., 2000; Chemilinsky, 1991). The determination of words and feelings towards some animals/plants could also increase the success (or failure) of an educational/conservational approach in schools (Barros et al., 2011; Haenn, 1999; Kellert & Wilson, 1993). Local knowledge (see Chapter 1) of natural ecosystems can for example provide further empirical data on temporal trends in bushmeat prey type, availability and ranging behaviour (Berkes, 1999; Berkes et al., 2000; Chemilinsky, 1991). If hunters know that a species is rare and reproduces only infrequently, they may be more likely to avoid hunting that species beyond the intensity that it can sustain (Barros et al., 2011); if they understand that certain animals only crop-raid when people have

removed all the natural plant foods, they may choose to leave natural buffers near fields to the advantage to humans and wildlife (McLennan, 2010) or alter their behaviour to minimize risks to humans (Sitati & Ipara, 2011). Greater understanding of what people know about the species that they live alongside or exploit is a further mechanism for conservation practitioners to gain access to the knowledge base that results in positive drivers for conservation (Borgerhoff Mulder et al., 2008), or understanding the negative aspects of perceptions due to incomplete knowledge or understanding which result in the intensification of conflict paradigms and potentially local extinctions.

6.1.1 Hypotheses

The Chapter will test the following hypothesis:

(I) Economic benefits of other animals to humans will contribute to positive perceptions towards those animals.

(II) Crop losses dues to crop-raiding behaviour by animals in the LCNP will produce more negative perceptions towards wildlife.

(III) Non-human primates will be more positively perceived by the Balanta ethnic group than by the Beafada, since they contribute to the Balanta's meat consumption but not for the Beafada (Muslim).

6.2 Methods and analysis

The results presented in this Chapter come from a range of complementary approaches, incorporating both quantitative and qualitative methodology (detailed in Chapter 3). In order to know and understand the two ethnic groups (Beafada and Balanta) perception's and attitudes towards wildlife inside the LCNP, I use a combination of: i) survey questionnaires (N=258); ii) in-depth interviews (N=40 men); iii) six focus-groups (N=62 women); iv) in-depth interviews to Park guards (N=7); v) questionnaires specifically designed for assessing local knowledge (N=60); and, vi) non-participant observation. All of these data were collected during a period of six months over three years (see Chapter 3).

Here I use these methods to examine how the local people perceived and classified wildlife in the LCNP, in terms of which wild animals are stated as being liked and/or disliked the most (see section 6.2.1 and Chapter 3). I also examine the local knowledge of the villagers regarding some specific animals and plants of the Park and the attitudes towards conservation held by both ethnic groups regarding the same specific animals and plants (see section 6.2.2). Bushmeat perceptions were also analysed based on the networks constructed in the ATLAS.ti software.

6.2.1 Top ranked species for various traits from the photos

In order to establish a *preference ranking* of the people's wildlife species preferences I adapted the sociozoologic scale structure developed by Arluke and Sanders (1996) and applied by Costa (2010) to several species in Guinea-Bissau (see Chapter 1). During the application of the survey questionnaires (N=258), I used photographs of both wild and domestic local animals [N=26 (Appendix 6)] to elicit responses about values (positive and negative) attached to these animals. The photographs were designed to ensure that both interviewer and respondents were referring to the same animals, although I recognise that similarity of animal identity may not imply similarity of the construct of identification and/or classification (Hill & Webber, 2010). The species were categorized by the researcher into livestock, primates and other wild animals (birds, fishes, reptiles, insects and mammals).

Respondents were asked to assign 11 traits or attributes which were: *good*, *bad*, *pretty*, *ugly*, *smart*, *less smart*, *edible*, *not edible*, *frequently seen*, *infrequently seen* and *similar to humans*, to these animals. As described in Chapter 3, these adjectives were chosen in an attempt to understand basic biophilic values of nature (Kellert, 2009), within the constraints of using translators and therefore a level of linguistic sophistication among the respondents that the Portuguese-speaking interviewers found hard to access. People were asked to provide the names of their top three animals for each trait. Wild and domestic species were randomly selected from a set of reported animals for the region. A control photo with an American mammal (capuchin monkey) was also used as a reliability mechanism (see Table of the Species named in this Thesis; see Appendix 6). Photo order of presentation was randomised and mixed between each presentation.

I calculated the top-five weight rank index (WRI) for each trait (see Chapter 4) and present a descriptive qualitative analysis to explore subjects' attitudes towards wildlife within

these scales. These attributed values were then compared with the role of the animals in the livelihoods of the respondents and how these were influenced by the regulations imposed by the implementation of the Park. Results were presented by ethnic groups and gender.

6.2.1.1 Roles that animals play in livelihoods

In order to determine which roles wild animals represent in both ethnic groups livelihoods, Beafada and Balanta, rankings of animals were made based on the percentages of villagers' responses: (i) crop pests ranking (responses were taken from the in-depth interviews to men and focus-groups to women); (ii) wild meat purchased ranking (responses were taken from the survey questionnaires); (iii) wild meat animal consumption ranking (responses were taken from the in-depth interviews to men and focus-groups to women); and, (iv) wild meat sale ranking (responses were taken from the in-depth interviews to men and focus-groups to women). Particularly for the wild meat sale ranking most results come from the eaters – Balanta; hunters were reluctant to disclose this information on religious grounds and because they were forbidden to eat this meat as Muslims.

6.2.2 Assessing local knowledge

The values attached to species as exemplified by the responses regarding photographs and by the ranks of pest/edibility could be independently constructed in the absence of any personal experience or understanding of the biological/ecological requirements of each species (see Introduction). Therefore, I used both a survey questionnaires (N=60) and the interview technique (N=60) to examine the local knowledge and the attitudes towards conservation held by men (N=15 Beafada and N=15 Balanta) and women (N=15 Beafada and N=15 Balanta), regarding specific animals and plants: chimpanzees; gazelles; baboons; cane rats; palm trees and African fan palm vital in this area for construction. These species, of economic value or which emerged in previous work as representing a cost to people, were presented via photographs (Appendix 7).

One main goal of my last field-work stage was to evaluate the knowledge as well as conservation attitudes of these two ethnic groups towards animals that they stated during the biophilic assessment as highly "valued" (were *pretty, smart, good, edible* and *similar to people*) or not valued (particularly due to crop-raiding). I chose four crop-raiding animals (chimpanzees, gazelles, baboons and cane rats) where one, the gazelles, were ranked highly in positive traits, while baboons and cane rats were top-ranked as crop-raiders, and chimpanzees

were our species of greatest conservation concern (see rankings of pests in section 6.3.4 and Chapter 3). The plants, while not explored in the value rankings, were known to be of considerable economic value from focus-group discussions.

First, with the use of 6 photographs showing the pictures of the animals and plants, mentioned above, I asked an open question where people individually (N=60) could explain, using their own words and concepts, the animal or plant in the photo and their feeling towards them.

Secondly, I attempted to assess interviewees' general knowledge of those specific animals/plants through seven true/false statements (Table 6.1). The statements used were taken from publications about these species and intended to address biological as well as ecological knowledge. This assessment of knowledge aimed to provide a comparison between the knowledge of the interviewees and the characterisation of these species in the scientific literature. For these true/false data and those on attitudes (see below) an SPSS data base was constructed and answers were analysed according to the ethnic groups and gender (see Appendix 8). However, the sample of men and women within each ethnic group was too small for statistical comparisons within or between groups (N = 15 in each group) and could have been skewed by single individuals who were simply reluctant to display knowledge or a lack of knowledge; as such results are presented and discussed qualitatively.

Table 6.1: List of the fourteen True/False statements.

	List of True/False Statements
T/F1	These animals live alone. Chimpanzees, gazelles, baboons, cane rats
T/F2	They live in the bush. Chimpanzees, gazelles, baboons, cane rats
T/F3	They live as long as people. Chimpanzees, gazelles, baboons, cane rats
T/F4	They have more than one baby at a time. Chimpanzees, gazelles, baboons, cane rats
T/F5	They sleep in the trees. Chimpanzees, gazelles, baboons, cane rats
T/F6	They eat fruits. Chimpanzees, gazelles, baboons, cane rats
T/F7	They are eaten by leopards. Chimpanzees, gazelles, baboons, cane rats
T/F8	They were planted by the old ones. Palm Trees, African fan palm
T/F9	Fruits are eaten only by people. Palm Trees, African fan palm
T/F10	They have many seedlings. Palm Trees, African fan palm
T/F11	They make fruits only once per year. Palm Trees, African fan palm
T/F12	Many animals use them. Palm Trees, African fan palm
T/F13	The leaves grow back when we cut them. Palm Trees, African fan palm
T/F14	They live longer than people. Palm Trees, African fan palm

Next, nine statements (Table 6.2) were designed to address the attitudes towards the conservation of the animals in this second series of photographs (Appendix 5). For these data an SPSS data base was constructed and answers were analysed according to the ethnic groups and gender (N=60).

Table 6.2: List of the nine statements.

List of Attitude Statements[1]	
S1	Where I live there are plenty of these animals.
S2	This animal eats my crops because they do not have food in other place of the Park.
S3	When I see this animal I feel so angry that I want to kill it.
S4	This animal eats my crops because he is bad.
S5	I do not care if this animal disappears from the Park.
S6	This animal is never hunted by men.
S7	I want this animal to continue to exist in the Park.
S8	This animal could disappear because of the hunting by men.
S9	There is enough space in this Park for him to live.

[1]The answers to these statements could be: chimpanzees and/or gazelles and/or baboons and/or cane rats or not any.

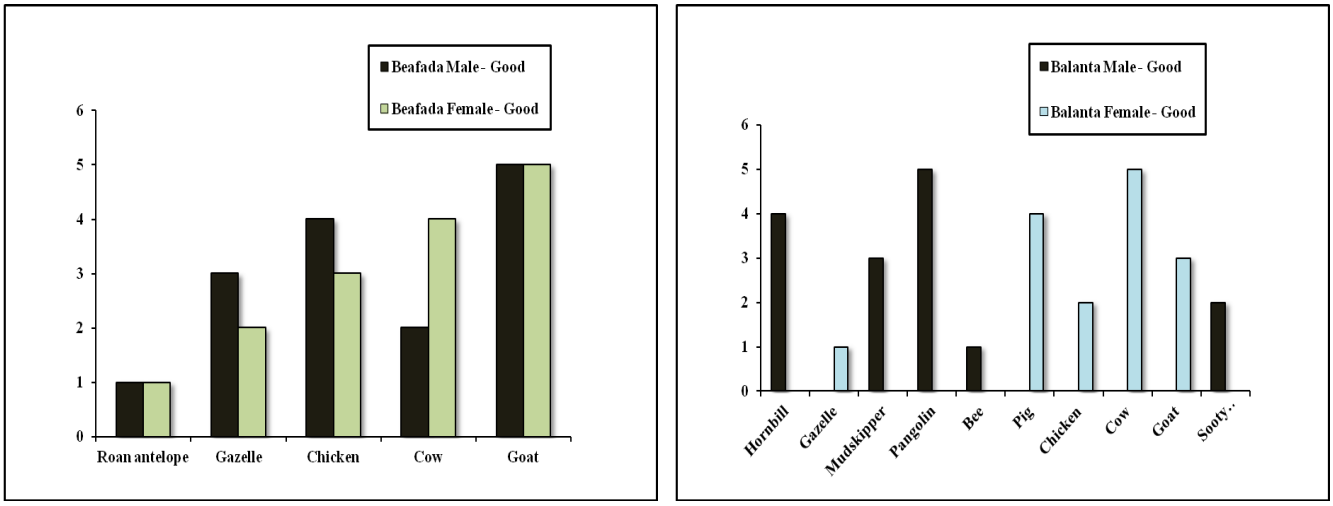
6.3 Results

The results are presented by ethnic group and gender throughout the Chapter in order to examine similarities and highlight differences.

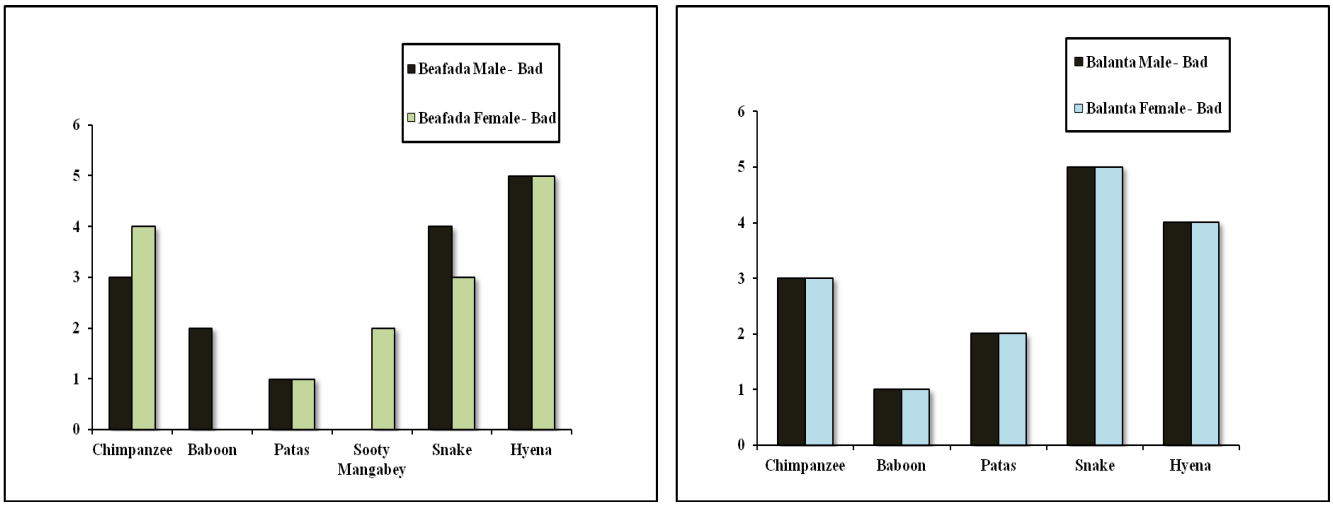
6.3.1 How people classify photos of animals when given specific adjectives by the researcher?

Regarding the moralistic trait *good* (Figure 6.1a), both Beafada men and women chose as their top two *good* species domestic animals: goats as their first and cows and chickens as their second. Gazelles and roan antelopes, both wild animals, were also in their top five choices, but as the last two or three chosen species. On the other hand, a completely different choice was made by Balanta men in particularly, because they did not chose any domestic animal within their top five good species, beginning with pangolins (wild animals) in the first place, followed by hornbills (wild animals), mudskippers (wild animals), sooty mangabeys

(wild animals) and bees at last. Balanta women's choice was more similar to the Beafada, because they stated that they perceived domestic animals as good animals first, cows, pigs and goats, respectively. Chickens and gazelles were in last on their top-five ranking choices.



(a) *Good* Trait

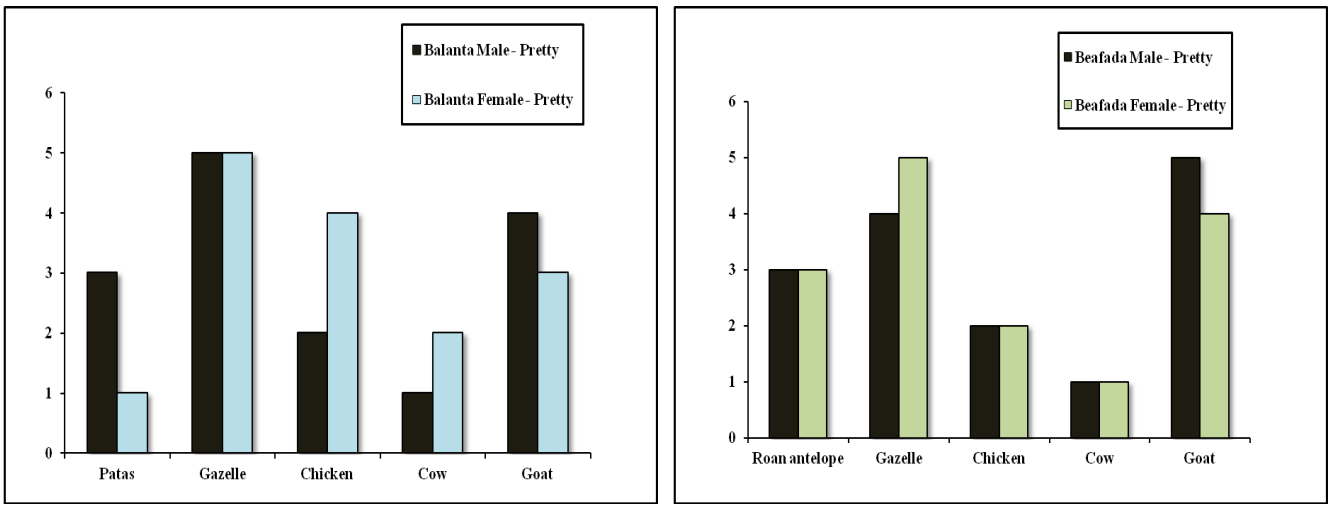


(b) *Bad* Trait

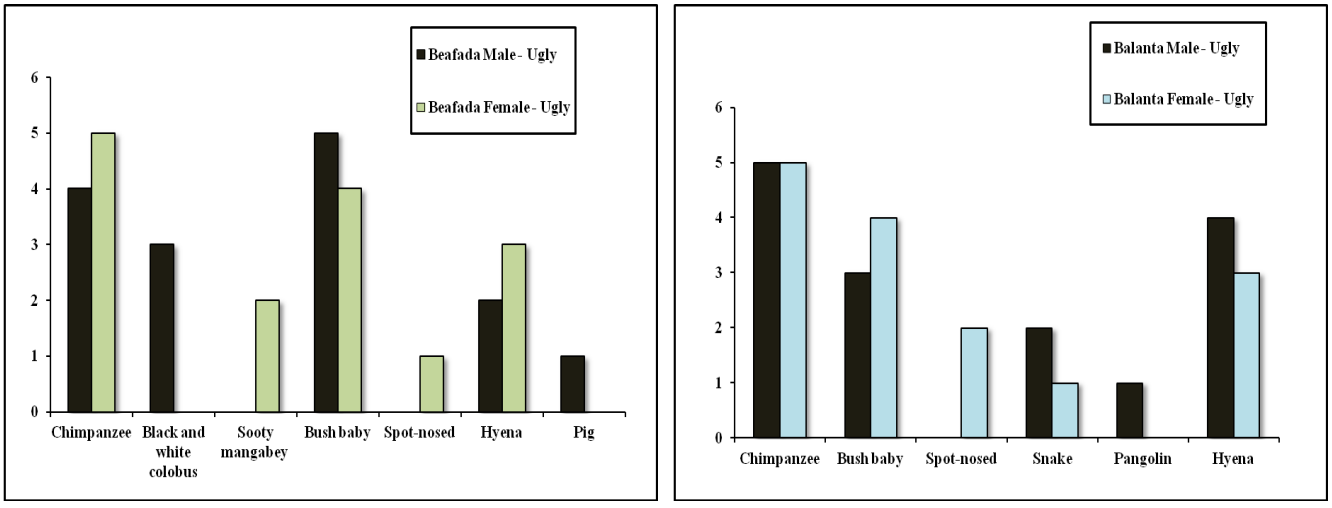
Figure 6.1: Comparing results from (a) *good* trait and (b) *bad* trait top-five weight rank index (WRI) of primates and non-primates from the survey questionnaire responses (N=258).

Regarding the moral and negativistic trait *bad* (Figure 6.1b), choices within each ethnic group were very similar. Hyenas and snakes appeared as the top two *bad* species for both men (Beafada and Balanta) and Balanta women. Only Beafada women classified chimpanzees as the second worst, while both men and Balanta women classified them in third place of their top five *bad* species ranking. Baboons, patas monkeys and sooty mangabeys appeared in the fourth and fifth positions of the ranking for each ethnic group and gender respectively.

Regarding the aesthetic trait *pretty* (Figure 6.2a), there seemed to be more differences between the two ethnic groups than in the previous traits. Both Beafada and Balanta chose as their first ranked *pretty* species to be gazelles, while the Beafada men chose goats first and gazelles second of their top-five *pretty* species ranking. Beafada considered roan antelopes, chickens and cows as the third *prettiest* species, respectively. Balanta ethnic group, apart from the similar choices of goats, chickens and cows, also mentioned patas monkeys as *pretty*, particularly the Balanta men (third position on their ranking), but also Balanta women (last position on their top-five ranking).



(a) *Pretty* Trait

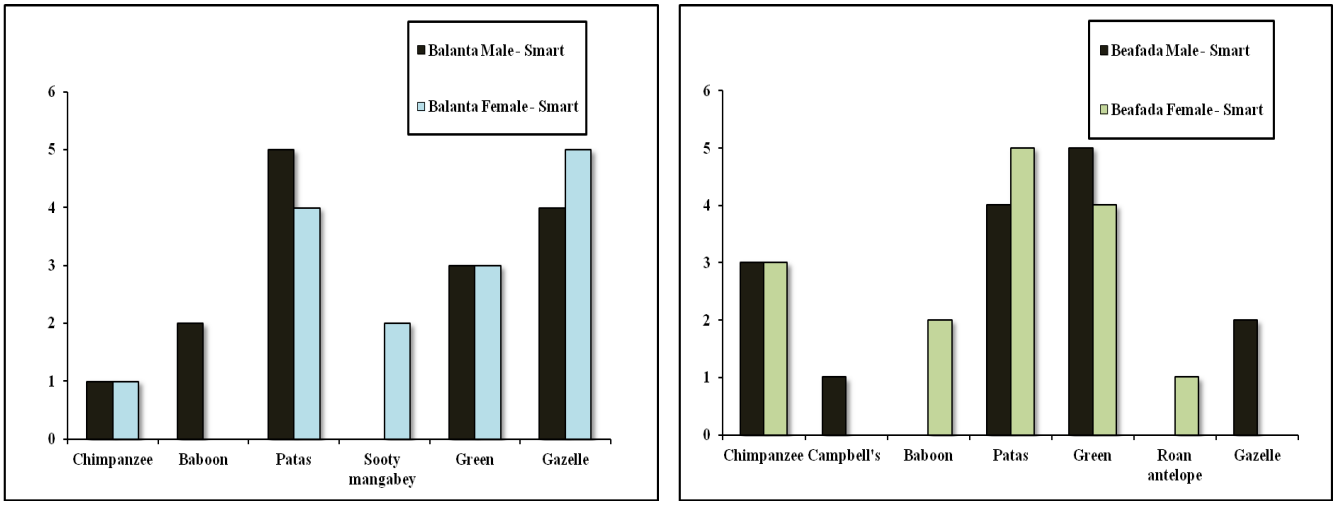


(b) *Ugly* Trait

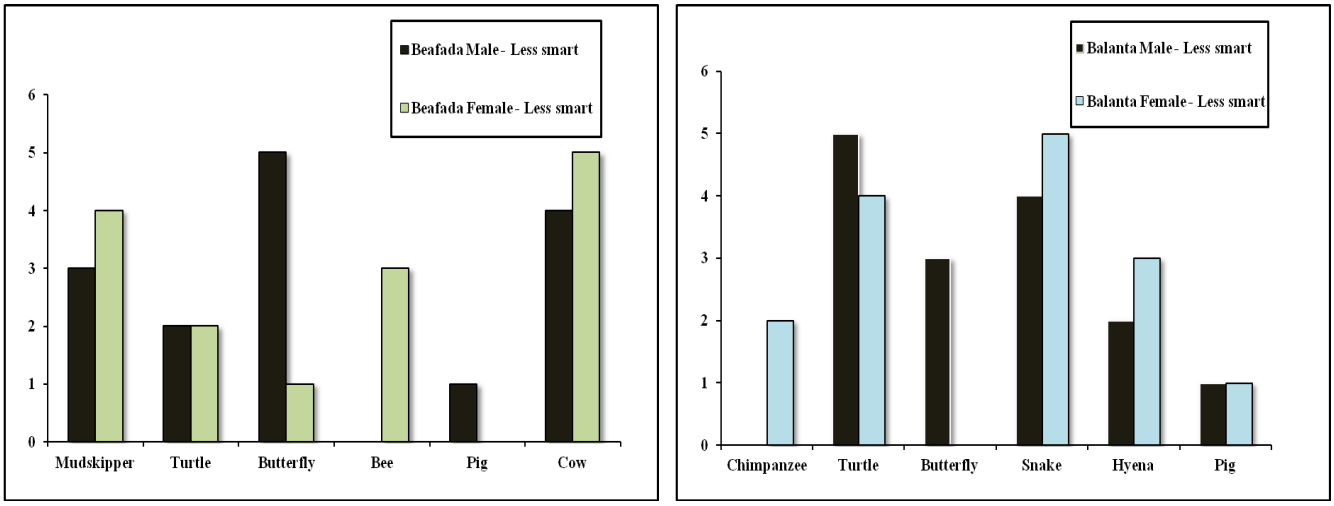
Figure 6.2: Comparing results from (a) *pretty* trait and (b) *ugly* trait top-five weight rank index (WRI) of primates and non-primates from the survey questionnaire responses (N=258).

In general, people appeared to perceive chimpanzees using the aesthetic trait *ugly* (Figure 6.2b), because they were classified as the first ranked (*ugliest* animal) by almost everyone, except by the Beafada men who perceived bush babies as the *ugliest* of the presented species. These primates and hyenas were the most chosen for the second and third places of the top-five *ugly* species ranked by all. However, the third ranked species differed between the two ethnic groups. While the Balanta perceived Lesser spot-nosed monkeys (only Balanta women), snakes and pangolins as part of the *ugliest* top-five, Beafada perceived as *ugly* the Western Black-and-white colobus monkeys (only Befada men), sooty mangabeys (only Befada women), Lesser spot-nosed monkeys (only Beafada women) and pigs (only Beafada men).

Primates appeared to be perceived as *smart* (naturalistic trait) animals by villagers (Figure 6.3a). Patas monkeys were chosen as first in the top-five *smart* species ranking by Beafada women and Balanta men, and in second by Beafada men and Balanta women. Instead of patas monkeys, Beafada men chose green monkeys as the smartest animals and Balanta women chose gazelles over any primates. Balanta men chose gazelles in second and both men and women perceived green monkeys as *smart* animals (third position), as other primates such as baboons (only Balanta men) and sooty mangabeys (only Balanta women). Lowest ranked animal for both Balanta men and women were chimpanzees. On the contrary, chimpanzees were classified by the Beafada as the third smartest animals, over gazelles, baboons, Campbell's monkeys and roan antelopes.



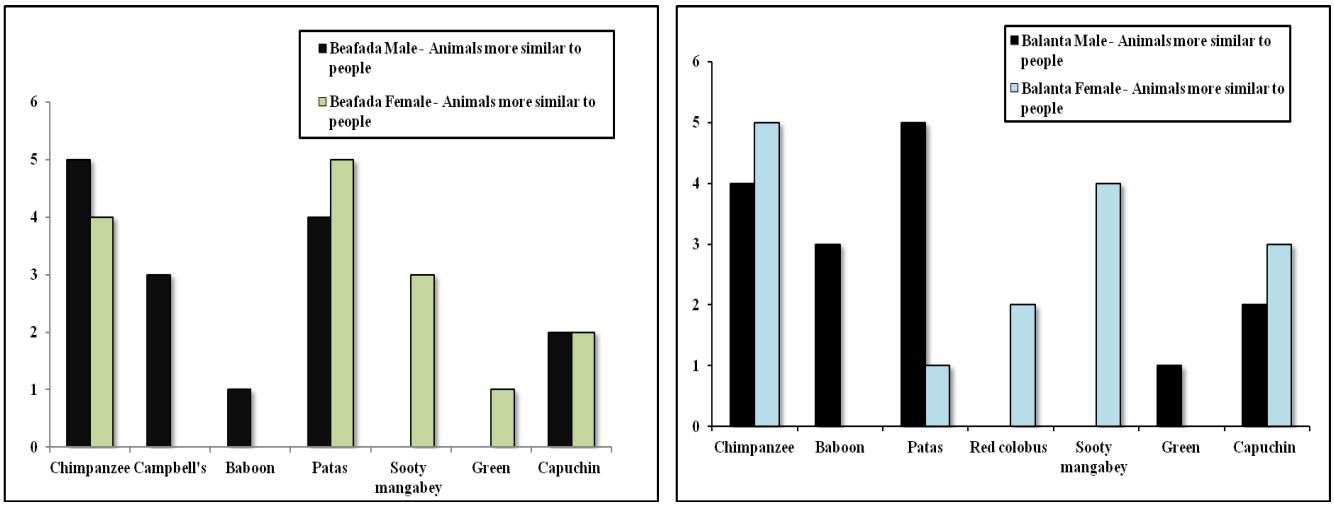
(a) Smart Trait



(b) *Less Smart* Trait

Figure 6.3: Comparing results from (a) *smart* trait and (b) *less smart* trait top-five weight rank index (WRI) of primates and non-primates from the survey questionnaire responses (N=258).

Regarding the naturalistic trait of *less smart* (Figure 6.3b), turtles were the most chosen animals by both ethnic groups. Although only Balanta men ranked these animals first, the others ranked them as second. Butterflies were the first choice of Beafada women, snakes of the Balanta women and pigs of the Beafada men. In terms of domestic animals only pigs and cows were chosen as *less smart* animals. The only primates in the presented list of animals were chimpanzees that were perceived only by the Balanta women as *less smart* animals (fourth position on their ranking).

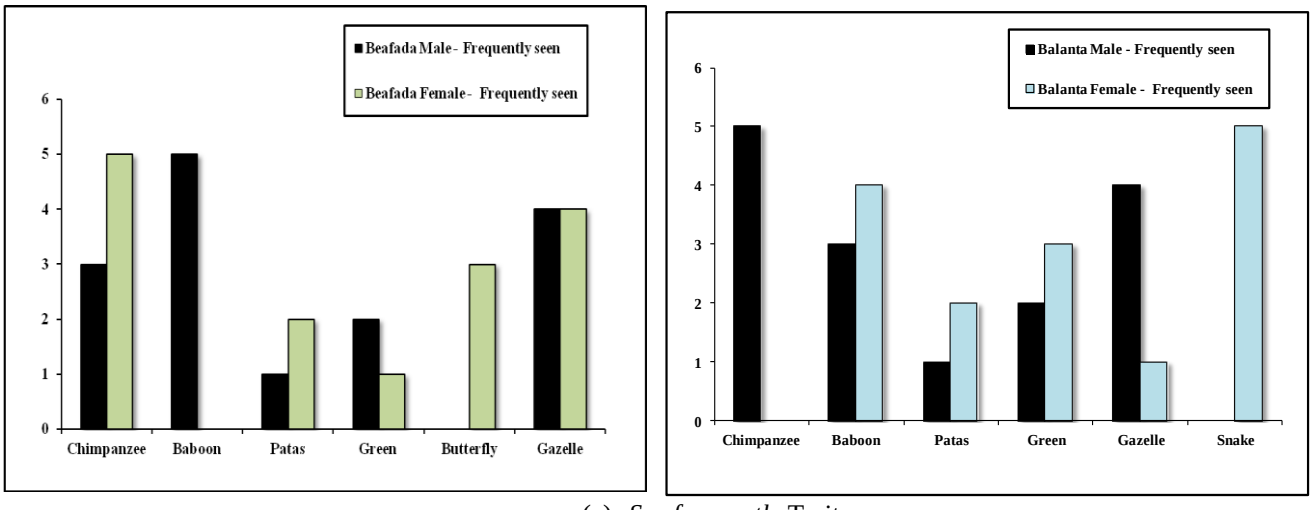


More similar to people Trait

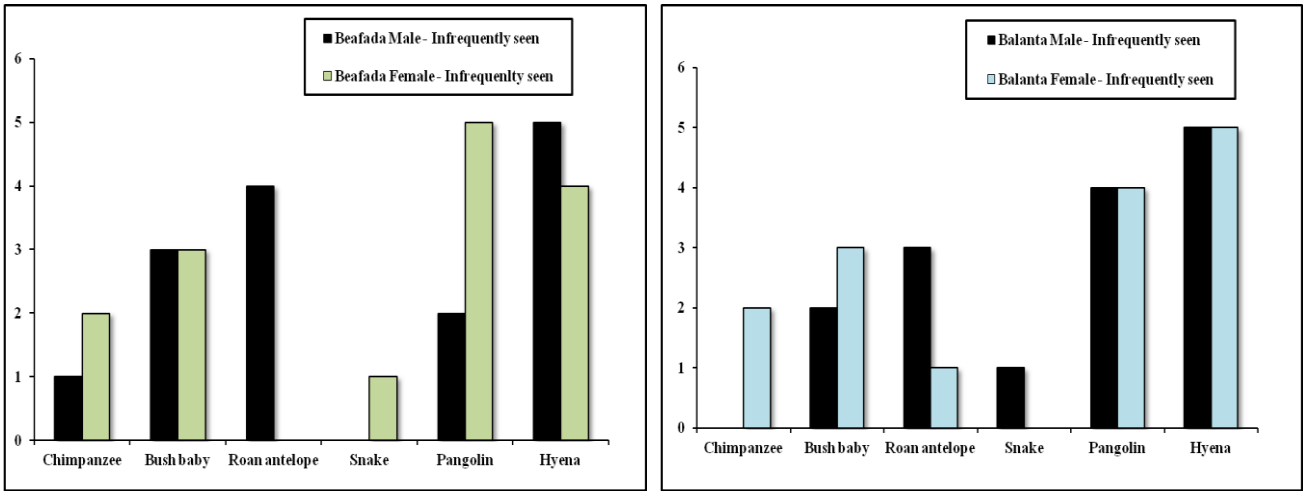
Figure 6.4: Results from animals *more similar to people* trait top-five weight rank index (WRI) of primates and non-primates from the survey questionnaire responses (N=258).

When asked about which animals respondents perceived as *the most similar to humans* (humanistic/symbolic trait), the choices comprised mainly primates (Figure 6.4). Chimpanzees and patas monkeys were the most frequently rated as *most similar to humans*, followed by sooty mangabeys, capuchin monkeys, baboons, Campbell's monkeys, Western red colobus and green monkeys. Apart from chimpanzees, patas monkeys and capuchin monkeys choices differed between men and women. In this choice of the *most similar to humans*, women chose primates as red colobus and sooty mangabeys, while men chose primates such as baboons, green monkeys and Campbell's monkeys.

For the scientific trait of *frequently seen*, respondents mentioned meeting chimpanzees and baboons often (Figure 6.5a). Patas and green monkeys, according to people's testimonies, were also very easy to find particularly in their crop fields. Patas monkeys were often mentioned by Beafada and Balanta women, and green monkeys by Balanta women. Baboons were not mentioned by Beafada women; instead they mentioned gazelles and butterflies as the second and third species *frequently seen* by them, respectively. Chimpanzees were not mentioned by Balanta women who chose snakes as the first animal *frequently seen*. Men's choices were similar between the ethnic groups; both chose the same animals sometimes in slightly different rank order positions. Along with similarities previously mentioned, both chose gazelles as the second most *frequently seen* animal.



(a) *See frequently* Trait



(b) *Infrequently seen* Trait

Figure 6.5: Comparing results from (a) *frequently seen* trait and (b) *infrequently seen* trait top-five weight rank index (WRI) of primates and non-primates from the survey questionnaire responses (N=258).

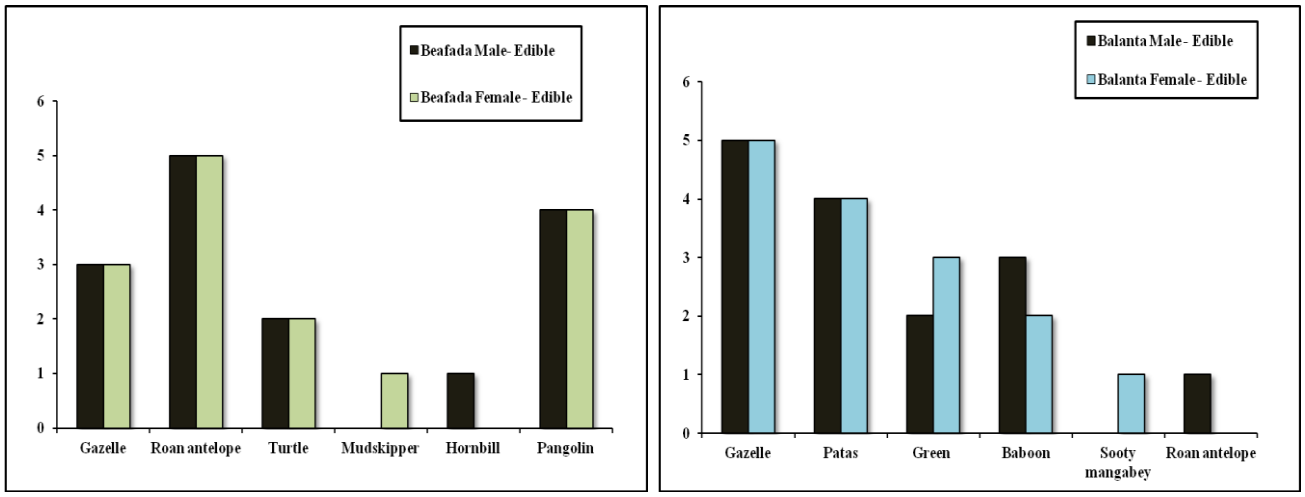
In general, the most *infrequently seen* (scientific trait) animals by villagers were hyenas and pangolins (Figure 6.5b). Both of these animals at the present time were difficult to find in the Park. Roan antelopes (another very difficult animal to find in the Park) and the nocturnal bush babies were among the second least seen chosen by all, except by the Beafada women who did not considered roan antelopes as an animal *infrequently seen*. However, these were very rare animals and a relative judgment of *infrequently seen* would be difficult if they were never seen at all. Chimpanzees and snakes were also mentioned as *infrequently seen* by Beafada and Balanta women in the case of chimpanzees, and Balanta men and Befada women in the case of snakes.

6.3.1.1 Edible and not edible wildlife – reflections of economic or subsistence values?

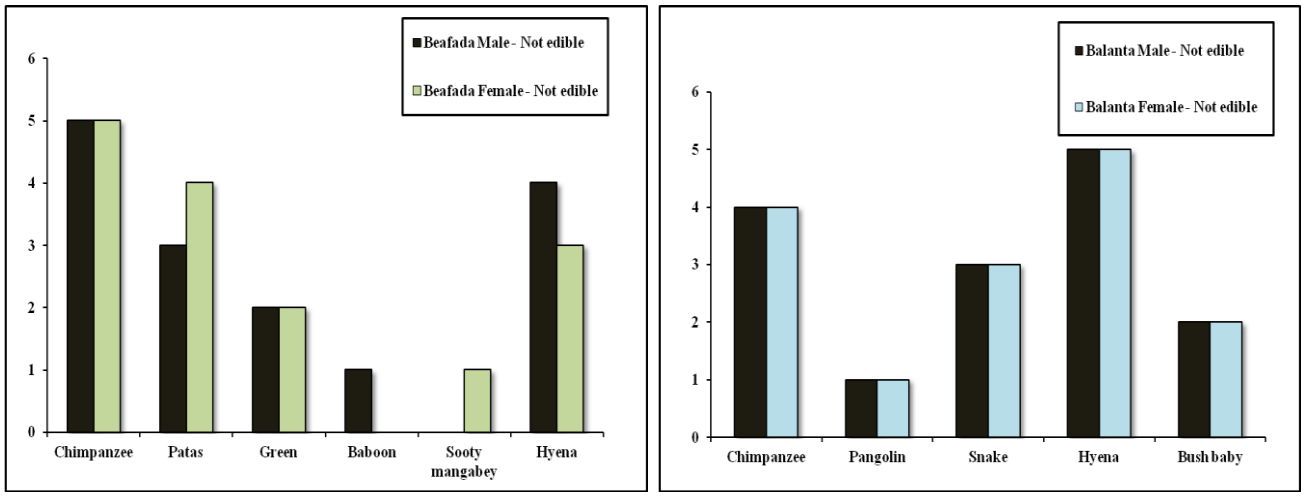
When interviewing respondents about utilitarian *edible* species, I removed the photos of domestic animals (which were kept for food production, at least by the Beafada ethnic group) in order to better understand which wild species were hunted and/or traded as bushmeat. Thus, I could better comprehend which wild species would be more susceptible to poaching and at a greater risk of extinction in this area of LCNP.

When asked about which animals the respondents perceived as *edible*, ethnic differences were clear (Figure 6.6a). As *edible* animals, both Beafada men and women chose only non-primate species such as roan antelopes (first), pangolins (second), gazelles (third),

turtles, mudskippers (only women) and hornbills (only men) as the last animals on their top-five edible species ranking. Balanta, on the other hand, seemed to perceive primates as *edible* animals. However respondents indicated that the most *edible* animal for both men and women was the gazelle, followed by patas monkeys (second), green monkeys and baboons in third and fourth positions (Figure 6.6a). In last, but still included in their top-five *edible* species Balanta chose sooty mangabeys (only women) and roan antelopes (only men).



(a) *Edible* Trait



(b) *Not edible* Trait

Figure 6.6: Comparing results from (a) *edible* trait and (b) *not-edible* trait top-five weight rank index (WRI) of primates and non-primates from the survey questionnaire responses (N=258).

The top-five *not edible* animals for both ethnic groups might be considered as the opposite of the top-five *edible* animals. Both Beafada men and women chose, apart from hyenas (second), only primates as *not edible* animals such as chimpanzees (first), patas

monkeys (second), green monkeys (third), baboons and sooty mangabeys in last (Fig 6.6b). Balanta seemed to perceive as *not edible* animals, hyenas (first) and chimpanzees (second) as the Beafada, but also snakes (third), pangolins (fourth) and bush babies in last position.

6.3.2 Local people's perceptions about chimpanzees

According to most respondents, no one kills chimpanzees to eat their meat (see Figures 6.7 to 6.10). Hunters used to hunt chimpanzees to capture their babies for sale or pets, but now according to people's testimonies there are fewer offspring. When talking to hunters (N=14) they also pointed out the fact that chimpanzees are strong and they could kill a man, so they seem to be feared and at the same time accorded respect due to their mentioned similarities to humans. Although, chimpanzees were considered to be crop-raiders (Figures 6.9 and 6.10), they did not damage the most frequently grown crops such as rice, maize or peanuts, because chimpanzees normally raided cashew plantations but ate only the fruit, leaving the seeds all together which is the most important part for the cashew trade (see also Casanova & Sousa, 2005; Hockings & Sousa, 2011).

…The only exception is the chimpanzee, because he looks like us and we respect him. He does not hurt people.

(Beafada hunter interview from Bacar-Conté village

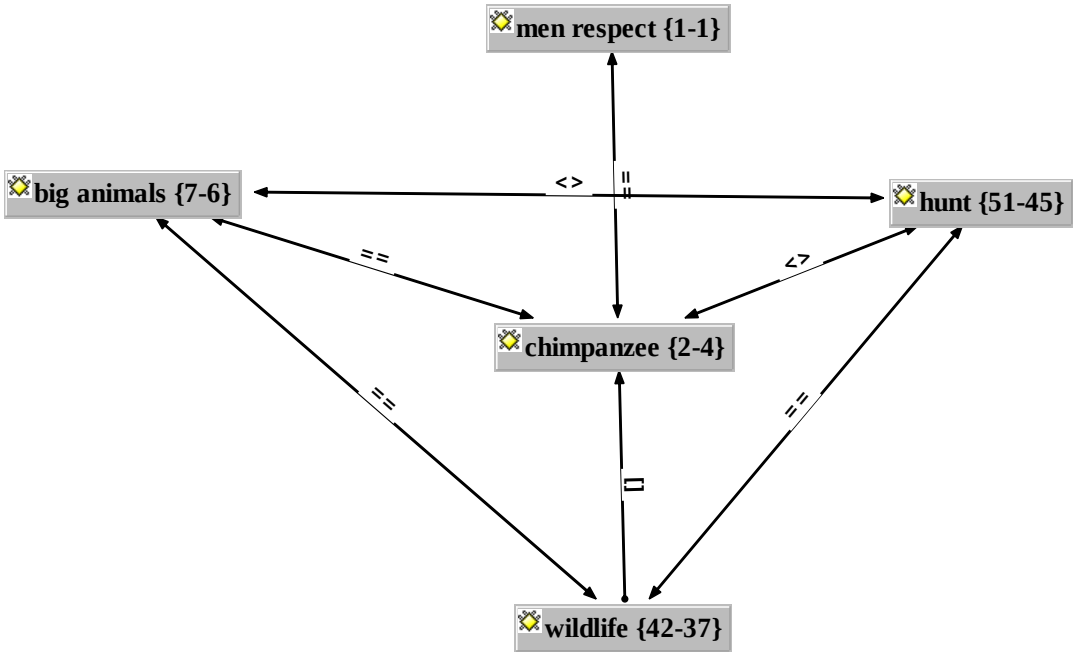


Figure 6.7: "Chimpanzee" network according to the perception of Beafada men (N=20).

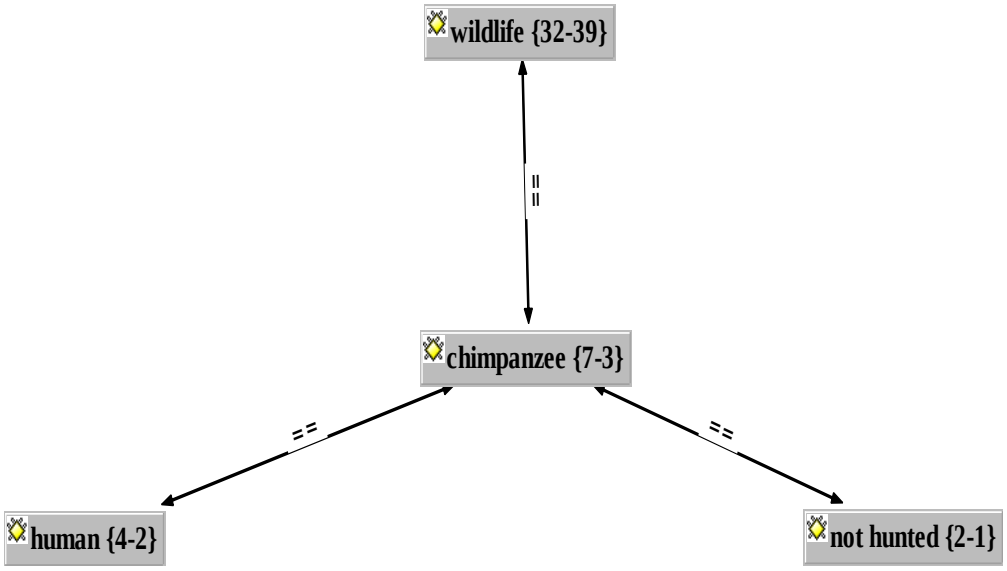


Figure 6.8: "Chimpanzee" network according to the perception of Balanta men (N=20).

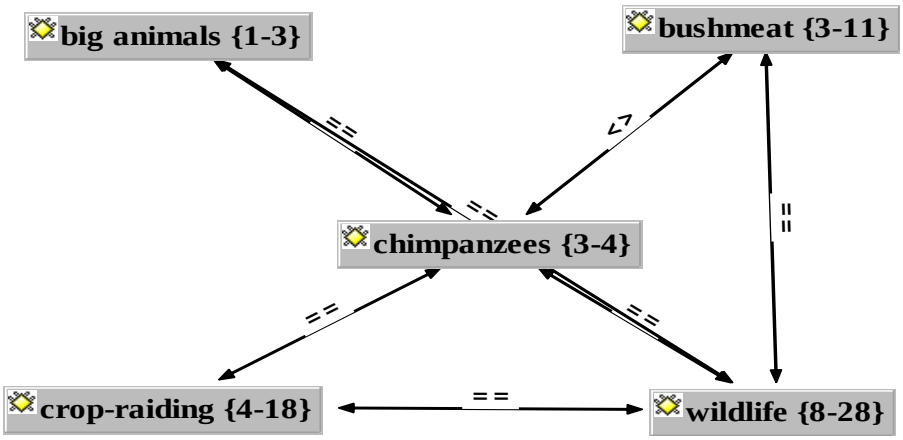


Figure 6.9: "Chimpanzee" network according to the perception of Beafada women (3 Focus-groups; N=37).

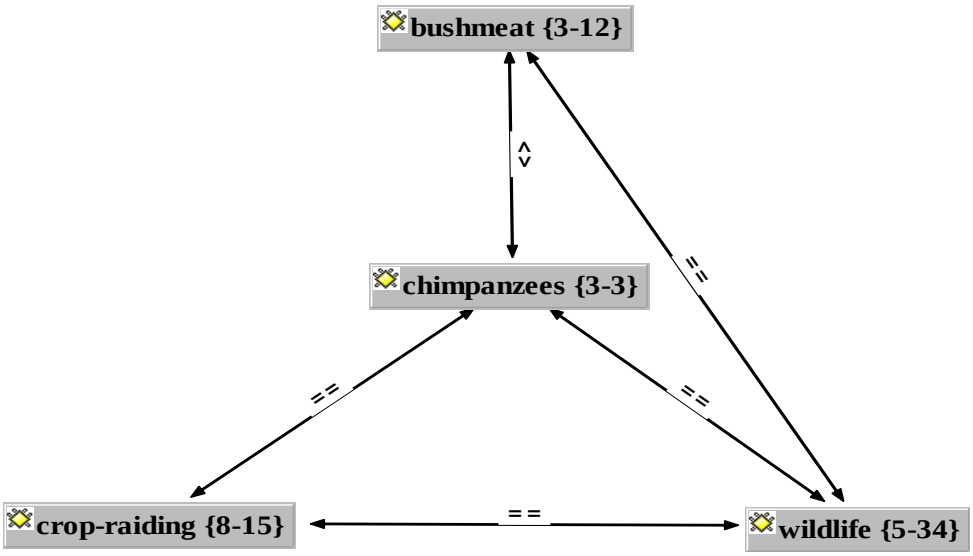


Figure 6.10: "Chimpanzee" network according to the perception of Balanta women (3 Focus-groups; N=25).

When asked about chimpanzee's meat, a Balanta hunter from Faraná village, during the interview told me that he had already tasted chimpanzee meat, but he did not like it because it was very tough and had a lot of fibers. He was the only person who admitted having tasted. He also told me a story in order to justify why chimpanzees are different from the other primates in his perception and why he stopped hunting them:

I was hunting near a waterhole to get more animals. One male chimpanzee appeared to drink water. First the chimpanzee looked around to see if there was any danger. After drinking, the male chimpanzee left and returned later with a female and her baby. When bringing the female with the baby, the male looked around and surveyed the area again because of possible dangers. The male was making sure no danger existed. Then they all left always looking to make sure no danger was present. Finally, the male considered that there was no danger so he brought the whole group to drink water. They all drank water and played there because it was safe. I could not shoot them because they think and act like humans: they want to make sure nothing happens to their family and they want to protect their relatives.

(Balanta hunter interview from Faraná village)

6.3.3 Ranking Animals

a) Ranking as pests

Men and women of both ethnic groups ranked different species as pests with consistency in rank only for the top two species among the Beafada (Figures 6.11 and 6.12). Among the Balanta the same species occurred in the top two, but their relative positions were reversed. The different experiences and economic activities of both men and women suggest some gender differentiation in perceptions of pests; ethnicity also produced variance in pest perceptions with a far wider range of species stated to be pests for the Balanta. It is important to note however, that for almost all people, cane rats and baboons were perceived of as the most significant crop-pests (Figure 6.13). Among the Balanta, it might be suggested that a greater match between perception and experience was expressed, since both men and women singled out a variety of different domestic species as major crop pests (Figures 6.12 and 6.13). Whether this is a function of differences in how livestock are herded and valued as opposed to how exposed fields are to attack from wildlife is unknown.

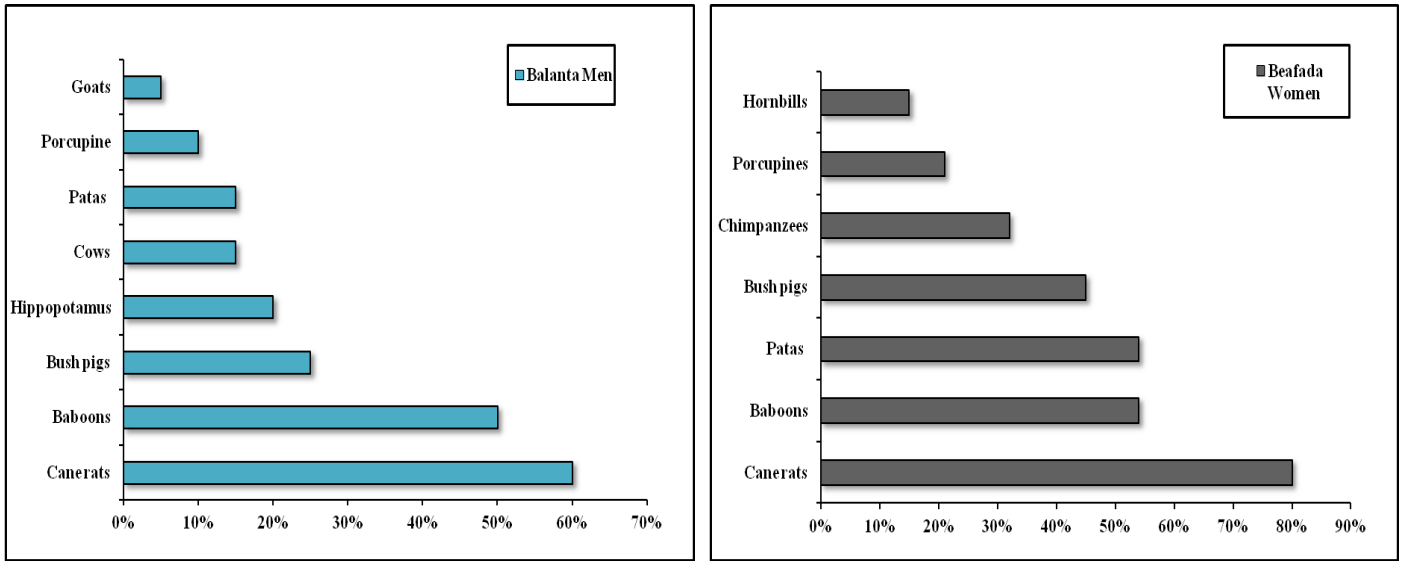


Figure 6.11: Ranking pests species according to Beafada men (N=20) and women (3 Focus-groups, N=37).

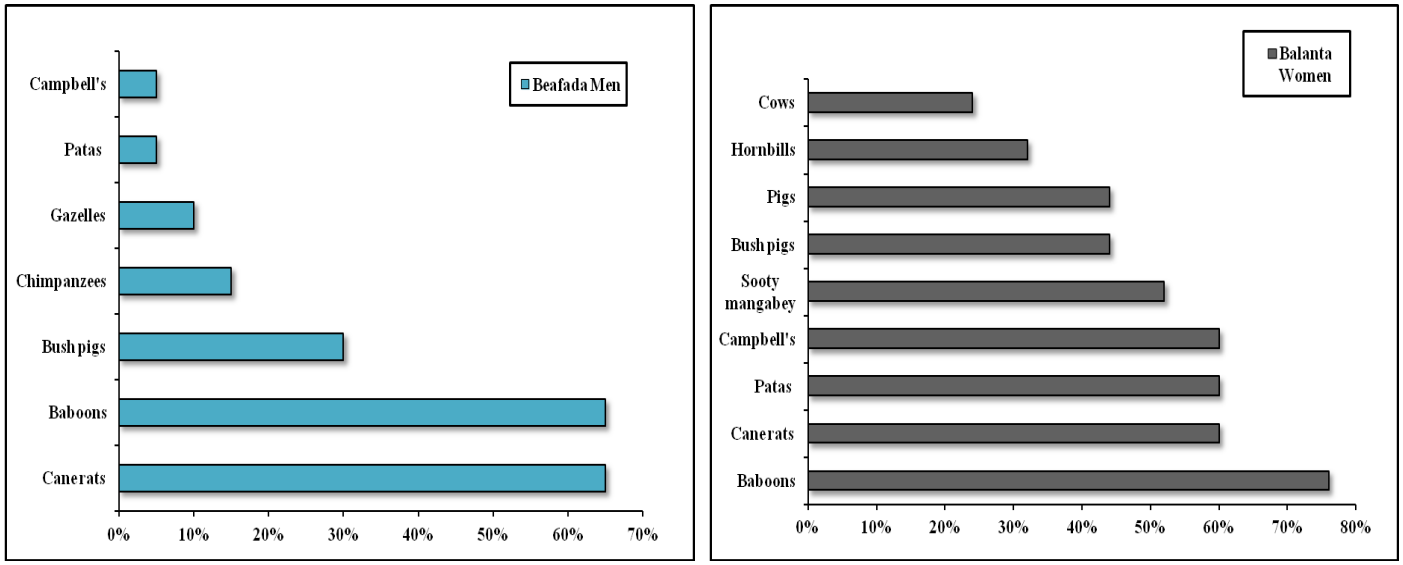


Figure 6.12: Ranking pests species according to Balanta men (N=20) and women (3 Focus-groups, N=25).

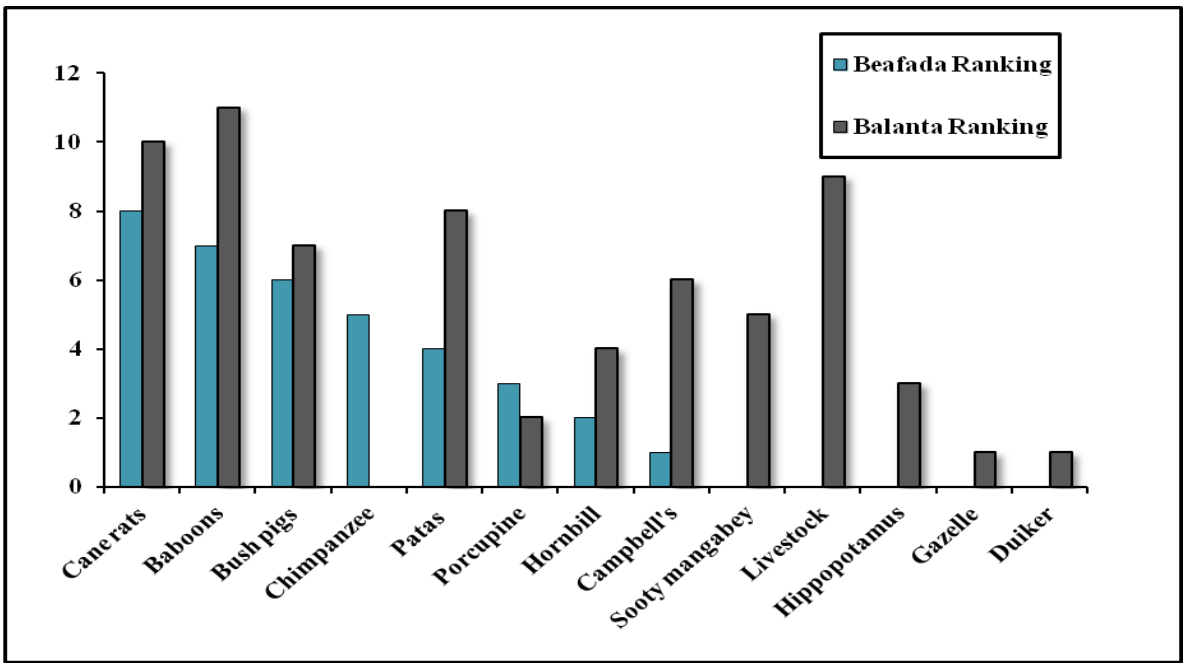


Figure 6.13: Comparison of ranking pests species between Beafada (N=57) and Balanta (N=45) ethnic groups (summing proportional rankings men and women in each group).

b) Ranking of wild animals for consumption

First, I asked about the wild animals that were bought, assuming that these would be purchased for household consumption (Figures 6.14 to 6.16). I also asked which animals were most often consumed (Figures 6.17 to 6.19). However, as people could hunt for personal consumption or purchase for gifts, the correspondence between answers was expected to be inexact.

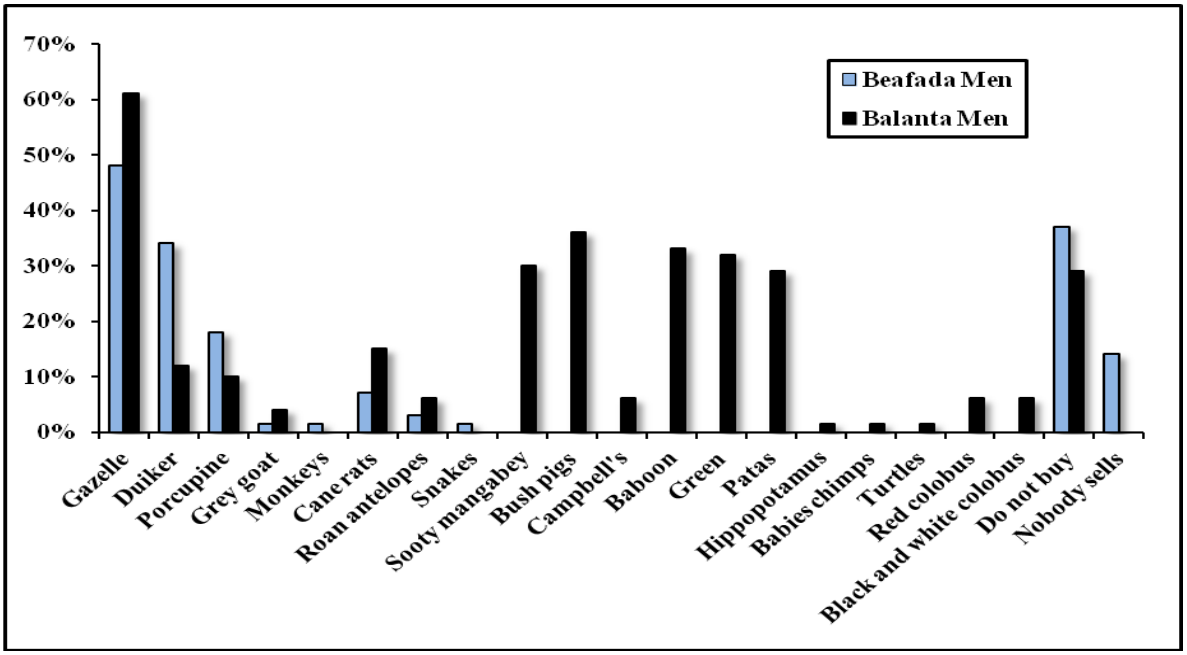


Figure 6.14: Ranking of the wild animals purchased according to Beafada (N=64) and Balanta men (N=65).

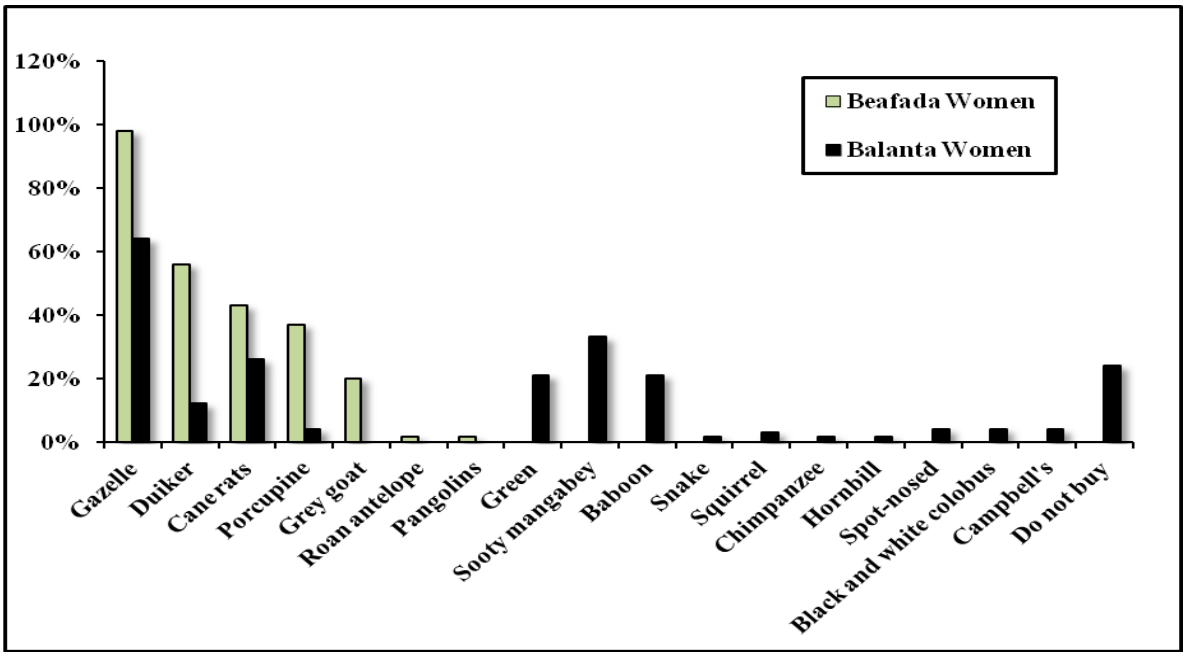


Figure 6.15: Ranking of the wild animals purchased according to Beafada (N=65) and Balanta women (N=64).

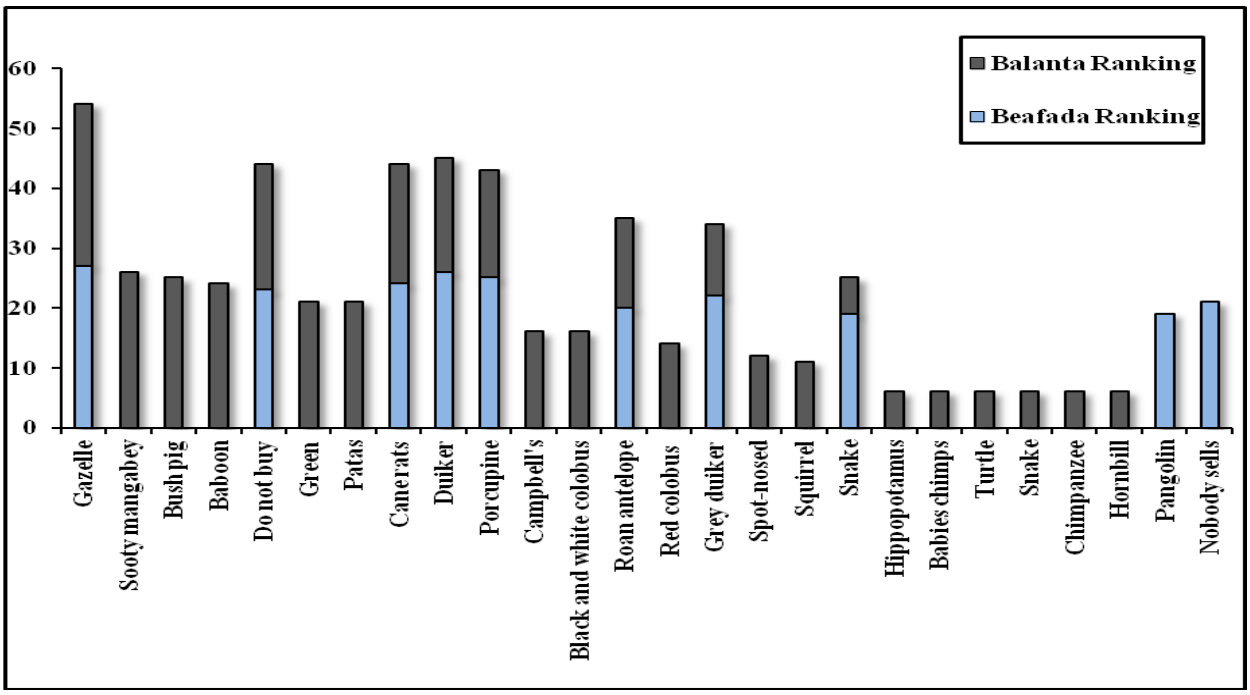


Figure 6.16: Ranking of the wild animals purchased by species according to Beafada (N=129) and Balanta (N=129) ethnic groups.

Wild animals that were stated as being consumed during the interviews (by contrast to the limited photos that were valued for the utilitarian trait of *edible*) differed between the two groups. Monkeys were ranked as consumed most among the Balanta, while the Beafada ranked various species of ungulate (gazelles and duikers) as most consumed (Figures 6.17 and 6.18). Men from both ethnic groups rated cane rats and porcupines as similarly consumed. Women's rankings of foods consumed were considerably restricted by comparison to men, possibly as a result of common agreements within focus-groups (Figures 6.17 and 6.18). Cultural rules, religion beliefs along with personal preferences obviously differentiate both ethnic groups in what they stated were highly valued as consumed species (Figure 6.19).

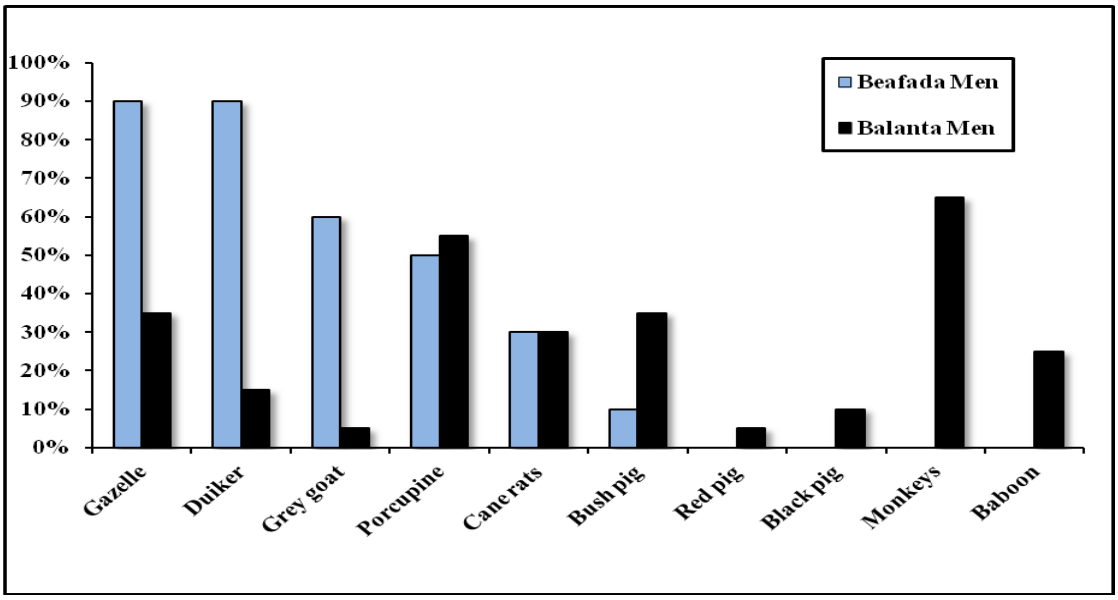


Figure 6.17: Ranking of the wild animals for consumption according to Beafada (N=20) and Balanta men (N=20).

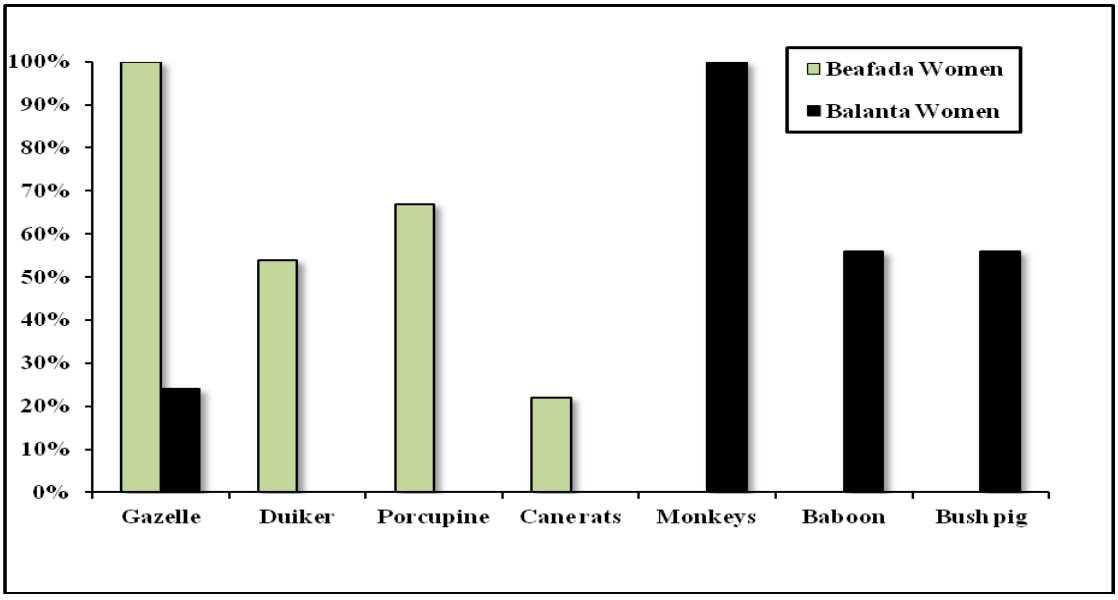


Figure 6.18: Ranking of the wild animals for consumption according to Beafada (3 Focus-groups, N=37) and Balanta women (3 Focus-groups, N=25).

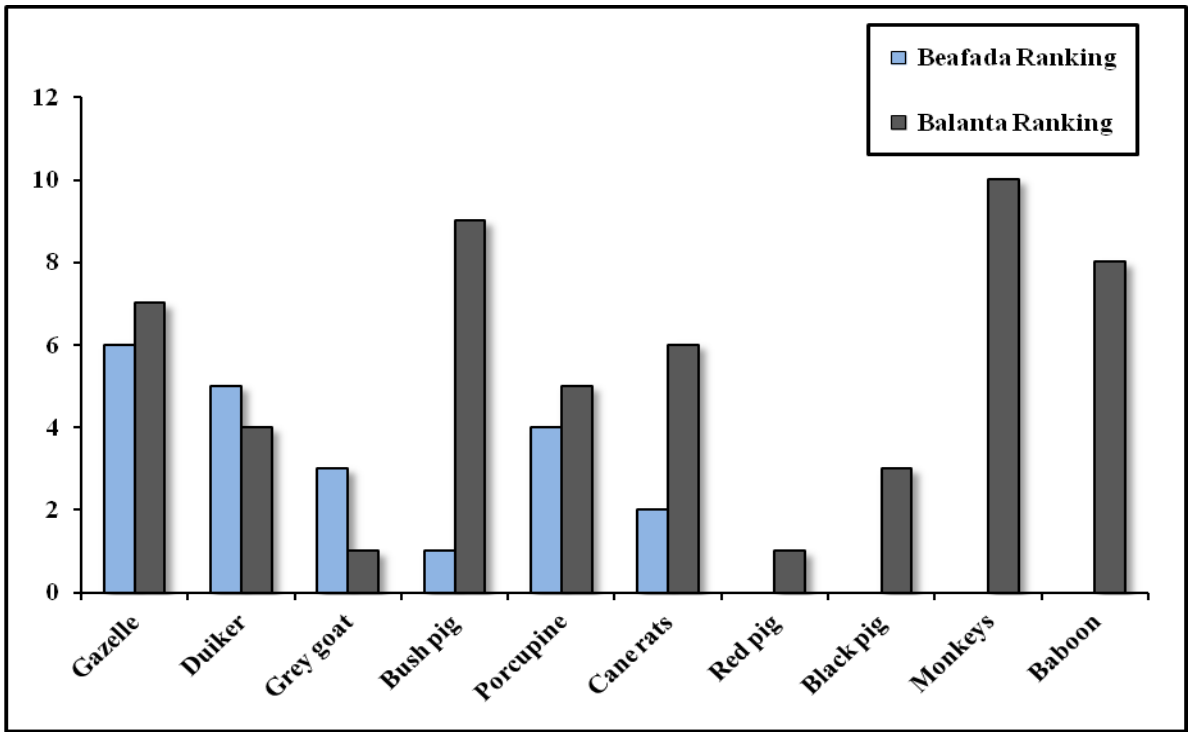


Figure 6.19: Ranking of wild animals for consumption by species according to Beafada (N=57) and Balanta (N=45) ethnic groups.

c) Ranking of wild animals for sale

Regarding the ranking of animals for sale Beafada men presented major percentages of wild species then did Balanta men (Figure 6.20), which could indicate larger quantities of hunted animals by the Beafada. Men and women from both ethnic groups ranked animals for sale differently from those hunted. As mentioned before, women's rankings of animals for sale were considerably restricted by comparison to men, possibly as a result of common agreements within focus-groups (Figures 6.20 and 6.21). Whether this was a difference caused by the focus-groups technique, the fact is that Beafada women mentioned in a much more affirmative way the selling of bush pigs and monkeys by the Beafada men than themselves (Figures 6.20 and 6.21). Although the Beafada do not eat bush pigs or monkeys due to their religion (Muslins) they still hunt these animals for sale. In fact, many Muslin men do eat monkey meat via *bafatório*, a technique used to "cover" the smell and breathe of alcohol (see Casanova, 2008). It is important to note however, that for almost all people, bush pigs, monkeys and gazelles were perceived of as the most significant animals for sale (Figure 6.22).

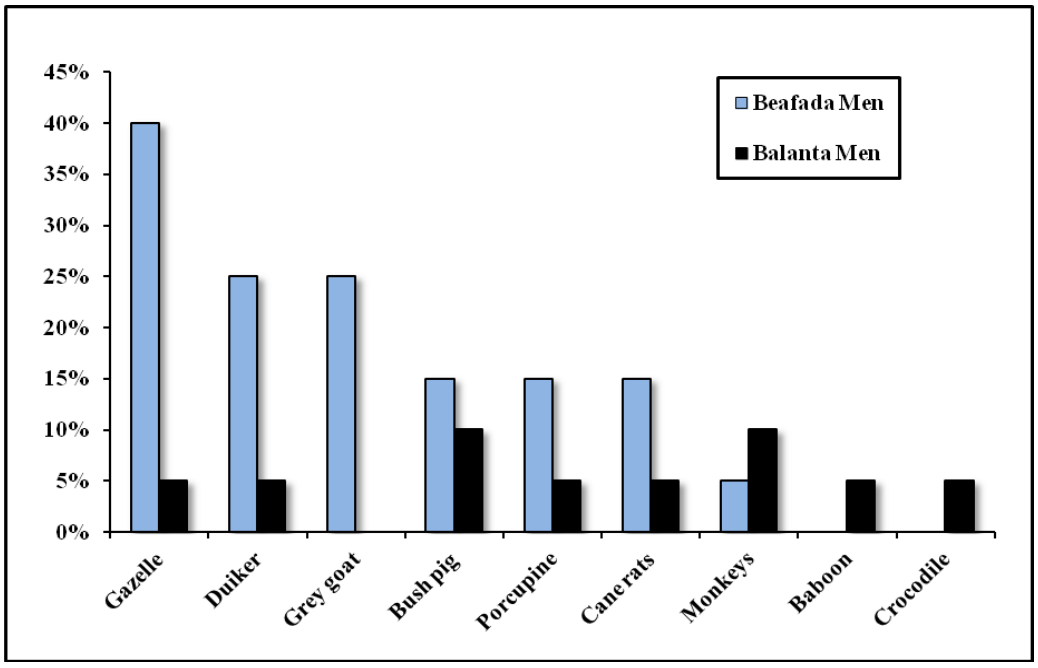


Figure 6.20: Ranking of the wild animals for sale according to Beafada (N=20) and Balanta men (N=20).

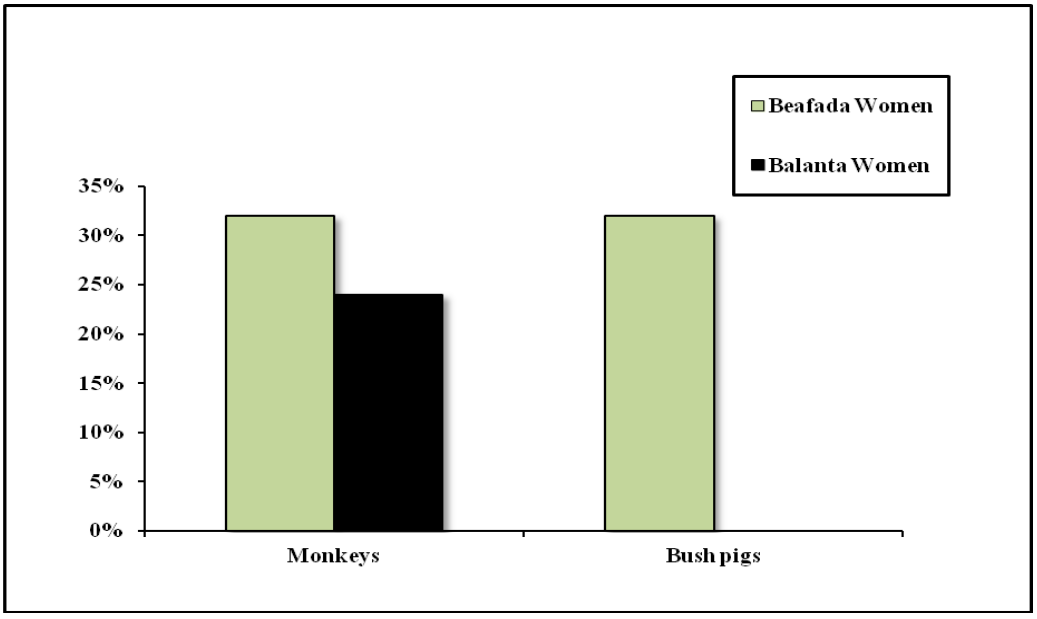


Figure 6.21: Ranking of the wild animals for sale according to Beafada (3 Focus-groups; N=37) and Balanta women (3 Focus-groups; N=25).

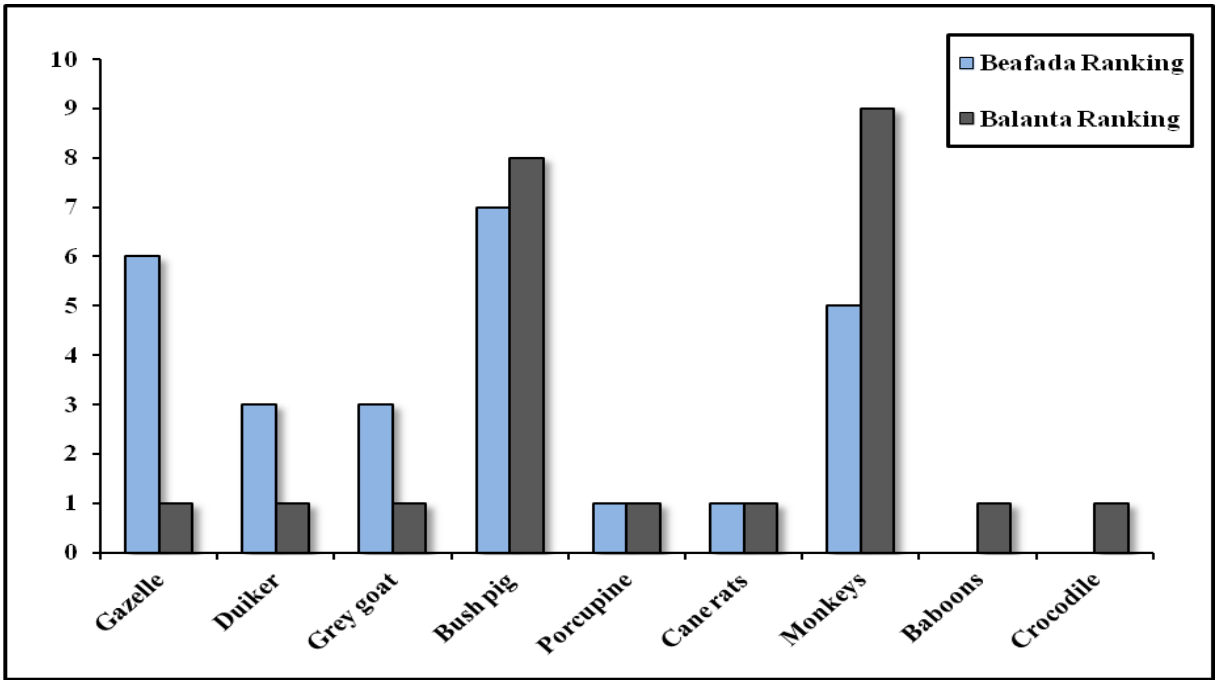


Figure 6.22: Ranking of the wild animals for sale by species according to Beafada (N=57) and Balanta (N=45) ethnic groups.

6.3.4Crop-raiding

When I presented animal photographs to the villagers (N=60) they immediately associated some of these animals with crop-raiding and described them based on their crop-raider characteristics. In general, regardless ethnic groups or gender, people chose as worst crop-raiders baboons and cane rats (see Table 6.3).

Table 6.3: Worst crop-raiding animals for both ethnic groups, Beafada and Balanta (N=60).

Gazelles	Baboons	Cane Rats	Chimpanzees
6,67%	**85%**	**81,67%**	11,67%

Although these animals had been chosen for presentation based on their ranking as crop pests (see section 6.3.4), people confirmed them as the worst crop-raiders. According to people's testimonies, baboons come in groups and beside their damage to almost every crop field for food, they tended to stay there and *play*, causing serious further destruction of what they did not eat. Therefore, they were considered as one of the worst crop-raiders. Cane rats were also seen as troublesome animals, because in addition to destroying the roots of rice and

other vegetables, they also appeared in groups, but during the night, which made them much more difficult to control.

6.3.5 Assessing local knowledge

Among the four wild animals listed above which were presented in the photographs used for assessing local knowledge, two – gazelles and chimpanzees – were indeed more positively perceived by local people than were cane rats and baboons. It was important to determine if attitudes towards the conservation of these same four animals were related with these positive or negative perceptions on the part of the locals, particularly in terms of crop-raiding, and how these perceptions and attitudes varied (if they did) in relation to the accuracy of knowledge held by individuals. For that, fourteen statements were designed to explore what people knew about the biology and behaviour of each of two plants and four animals and therefore to address attitudes towards the conservation of the animals in the photographs (Table 6.4).

Table 6.4: Percentages of the correct answers for each animal/plant, Befada and Balanta (N=60).

Responses to True/False Statements		***Major Pest Baboons % overall***	***Major Pest Cane rats % overall***	***Minor Pest Gazelles % overall***	***Minor Pest Chimpanzees % overall***
T/F1	These animals live alone.	100%	96,6%	76,7%	96,6%
T/F2	They live in the bush.	100%	96,6%	96,6%	100%
T/F3	They live as long as people.	83,3%	16,7%	83,3%	15%
T/F4	They have more than one baby at a time.	86,7%	100%	98,3%	0%
T/F5	They sleep in the trees.	98,3%	100%	100%	95%
T/F6	They eat fruits.	91,7%	50%	51,7%	78,3%
T/F7	They are eaten by leopards.	8,3%	68,3%	85%	1,7%
Responses to True/False Statements		***Palm Tree % overall***		***African fan palm % overall***	
T/F8	They were planted by the old ones.	90%		90%	
T/F9	Fruits are eaten only by people.	93,3%		88,3%	
T/F10	They have many seedlings.	100%		100%	
T/F11	They make fruits only once per year.	96,7%		96,7%	
T/F12	Many animals use them.	96,7%		95%	
T/F13	The leaves grow back when we cut them.	100%		100%	
T/F14	They live longer than people.	100%		95%	

According to the results, the knowledge of interviewees was greater for the plants presented in the photographs than for the animals [Table 6.4]. Of the four animals, the knowledge of chimpanzees and cane rats received more incorrect answers. Statements about longevity (T/F3), number of babies (T/F4) and predators (T/F7) produced the highest number of incorrect answers. Interviewees believed that cane rats had longevity equal or higher than humans, that chimpanzees have more than one baby at a time while cane rats have only one, and that only cane rats and gazelles could be eaten by leopards. Local people seem to have a greater knowledge about gazelles and baboons maybe due to a closer proximity (also "seen frequently") with these animals. The feeding statement (T/F6) regarding gazelles and the predator statement (T/F7) regarding baboons produced higher levels of incorrect answers. People seemed divided in their opinion of the statement that gazelles and cane rats eat fruits

and did not believe that leopards could be a predator of baboons and chimpanzees. The statements regarding the plants represented a high level of correct answers (95% to 100%) by the interviewees in general, which means that their knowledge was very similar to the scientific consensus about these same species.

In the initial study of biophilic traits, we asked the open question: *which species of all in the forest do you prefer to see and which not to see?*. Individuals choose a variety of different animals (N=18); it was interesting that there was relatively little consistency other than the so-called gazelle (a name which encompassed a diverse range of ungulate species), which 55% of people liked to see. People did not like to see snakes (25%), hyenas (25%) or chimpanzees (20%). Only minor differences were seen by gender and ethnicity (Appendix 9). Species investigated for knowledge and attitudes (chimpanzees and gazelles) thus reflected these dichotomy liked/disliked attributes. Nine statements were designed to address attitudes towards the conservation of the animals in the photographs (Table 6.5).

Table 6.5: Results from responses "Agree" to attitude statements, Befada and Balanta (N=60).

Responses to Attitude Statements		***Major Pest Baboons % overall***	***Major Pest Cane rats % overall***	***Minor Pest Gazelles % overall***	***Minor Pest Chimpanzees % overall***
S1	Where I live there are plenty of these animals.	76,7%	95%	63,3%	66,7%
S2	This animal eats my crops because they do not have food in other place of the Park.	28,3%	31,7%	28,3%	26,7%
S3	When I see this animal I feel so angry that I want to kill him.	40%	58,3%	3,3%	21,7%
S4	This animal eats my crops because he is bad.	50%	61,7%	1,7%	3,3%
S5	I do not care if this animal disappears from the Park.	26,7%	38,3%	0%	13,3%
S6	This animal is never hunted by men.	1,7%	0%	0%	100%
S7	I want this animal to continue to exist in the Park.	53,3%	48,3%	93,3%	75%
S8	This animal could disappear because of the hunting by men.	45%	33,3%	66,7%	0%
S9	There is enough space in this Park for him to live.	81,7%	71,7%	100%	95%

It was clear that most people, irrespective of gender or ethnicity, held similar attitudes to each of the species (Table 6.5), but that these varied between the species. In general, respondents from both ethnic groups have visual or physical contact with all of these four animals. The percentages were similar for all the animals regarding the statement that these animals do not have another place inside the Park to forage instead of in people's crop fields. In general, the emotion of willingness to kill these animals was reported in particular for cane rats and baboons. Negative attitudes due to eating crops were again more connected with cane rats and baboons. No one seemed to want gazelles to disappear from the Park; however, both ethnic groups mentioned chimpanzees, baboons and cane rats as animals that could disappear. While there was a lower percentage for the agree responses for this statement regarding the chimpanzees, percentages for those people happy to see baboons and cane rats disappear were similar. According to the interviewees, chimpanzees were the only animals never hunted by men. Gazelles ranked top among the animals which could continue to exist, followed by chimpanzees, and at last baboons and cane rats. Gazelles were the animal that, according to the respondents, had the higher probability in disappearing because of the hunting, followed by the baboons and cane rats at last. Chimpanzees, as previous mentioned, were not hunted. Although with far fewer "agree" responses regarding cane rats and baboons, all animals were seen as continuing to have space to live inside the LCNP, according to villagers' testimonies.

6.4 Discussion

Local people's attitudes towards wildlife may vary within a community according to their religion, gender, prior experience with wildlife, costs or benefits of certain species, among other factors. This Chapter evaluated reported perceptions and attitudes of the local people towards the wildlife within the LCNP.

Perceptions of nature are structured by experiences, cultural norms and values and in some societies exist in a hierarchy of ranked values attributed to living organisms (Kellert, 1996, 1997). During the attribution of biophilic values of nature (Kellert, 2009) by both ethnic groups, their choices of animals seemed very similar regarding the majority of values. Only in the attribution of the utilitarian biophilic value (*edible/not edible* trait) differences were more evident. This value reflects the human inclination to affiliate with nature for its material and commodity advantage (Kellert, 2009). Balanta are mainly non-Muslims and they do not have any external religious food restrictions. The animals that they pointed out as not edible were mainly due to the fact that these are not found in the forest or for sale (hyenas, snakes,

pangolins and bush babies), with the exception of chimpanzees. Beafada are mainly Muslims and they do not eat pigs or monkeys (although they hunt them for sale), so they chose as edible all the other animals presented in the photographs, except for snakes and hyenas (who they considered too ugly and dangerous to hunt and consequently to eat). Gazelles seem to be the edible animal in common between the two ethnic groups, while chimpanzees and hyenas were the not edible animals.

Religion appeared to underlie some major differences in the way subjects classified the species. However, the case of the chimpanzee could be explained by the attribution of the humanistic and symbolic biophilic values (*more similar to people* trait) by both ethnic groups. Humanistic value reflects the ability of the natural world to provoke human affection and emotional attachment (Kellert, 2009), which was expressed by the perception of the Balanta hunter interviewee where he explained that he could not kill chimpanzees because they want to protect their families such as humans. Attitudinal values and perceptions towards chimpanzees seem to represent less of the utilitarian value and more of the humanistic, symbolic and naturalistic values. Also, chimpanzees did not damage the most frequently grown crops such as rice, maize or peanuts, or cashew plantations (see also Casanova 2008; Hockings & Sousa, 2011). According to Hill and Webber (2010) when primates behave in ways that meet people´s expectations, people particularly acknowledge the aspects that make the animal "more human" as in the case of the chimpanzee. Although interviewees also associated other non-human primates with humanistic and symbolic values, these same primates were associated with the utilitarian value (*edible/not edible* trait).

Preferences for wildlife species vary greatly and could be influenced by global attitudes like general preferences for certain flagship species or by specific experiences with animals and the problems they cause (Kaltenborn et al., 2006). Baboons and cane rats were an example of not valued animals, particularly due to crop-raiding. However, it is not just the amount of damage animals' cause that determines the degree to which people view them negatively: the ways in which they are believed to behave is also determinant (Bennett & Ross, 2011; Hill & Webber, 2010; Lee & Priston, 2005; Webber et al., 2007). Local people describe baboons as worst crop-raiders because they come in groups and beside their damage to almost every crop field for food; afterwards they tended to stay in the crop fields causing serious further destruction of what they didn't eat. Cane rats were also seen as troublesome animals, because in addition to destroying the roots of rice and other vegetables, they also

appeared in groups, but during the night, which made them much more difficult to control. Nocturnal species are also less tolerated then most diurnal species, possibly due to the lack of alternatives in controlling the damages caused (Hill, 2004; Naugthon-Treves, 2001).

The effectiveness of species conservation efforts depends upon perceptions of the species – to some extent the degree to which various wildlife species are liked or disliked, valued or devalued, or play a role in human existence (Kellert & Wilson, 1993). In the case of the gazelles in terms of trait attribution gazelles were considered *pretty* (aesthetic value), *smart* (naturalistic value), *good* (moralistic value) and *edible* (utilitarian value), all considered as positive traits for local people. Gazelles were also considered as one of the least concerned crop-raiders. However, although gazelle were perceived as a highly "valued" animal this did not make people less likely to hunt it or to contribute to its conservation, since it is one of the most desired animals for sale and consumption by both ethnic groups. It seems though that positive perceptions do not always mean positive attitudes towards species conservation.

In terms of the assessed local knowledge this was greater for the gazelles – a highly "valued" animal - and baboons – a less "valued" animal - than it was for chimpanzees and cane rats, maybe due to a closer proximity and therefore greater experience with these animals. Although local people seem to prefer gazelles as the animal which could continue to exist in the Park rather than baboons, their attitudes towards these species conservation were the same. Gazelles and baboons were the most frequently hunted animals inside the Park.

The plants, while not explored in the value rankings, were known to be of considerable economic value from focus-group discussions. Interviewees held more extensive knowledge about the plants (palm tree and African fan palm) than about the animals (chimpanzee, gazelle, baboon and cane rat).

6.5 Conclusions

Knowledge seemed to play less of a role in engendering positive attitudes than did values (as humanistic and symbolic in the case of the chimpanzees). While the utilitarian and moralistic perceptions of species like gazelles were also positive, these perceptions did not make people less likely to hunt them or to contribute to their conservation. This combination of attitudes may pose the greatest risk to the species future. The moralistic and negativistic traits associated with crop-raiders were associated with negative conservation attitudes.

Negative attitudes are a function of the degree of contact with species as pests (Bennett & Ross, 2011; Gillingham & Lee, 1999; Hill, 2005; Lee & Priston, 2005) particularly when farmers engage in market economy, perceptions of the damage caused by crop raiding tended to be worst (Lee & Priston, 2005; Naughton-Treves, 1997). Furthermore, it is not uncommon to find that negative perceptions expressed on surveys are not consistent with realities on the ground (Bennett & Ross, 2011; Gillingham & Lee, 2003; Hill, 1997, 2000; Naughton-Treves, 1997; Priston, 2001).

Unlike others primates, baboons appear firmly rooted within the role of pests and nothing more than a threat to people's livelihoods. Perceptions about this animals needs to be worked through the development of culturally sensitive and appropriate conservation education initiatives with the aim of promoting more positive attitudes, thus increasing local tolerance toward target species (Hill, 2005; Lee & Priston, 2005; Osborn & Hill, 2005). In order to reduce the conflict between species and local people strategies should be implemented after an assessment of the real problem, not only based on perceptions that do not always reflect the real problem.

Chapter 7

Is there a future for biodiversity in LCNP?

7.1 Introduction

This dissertation has explored the links between livelihoods and protected areas in the Lagoas de Cufada Natural Park (LCNP) in Guinea-Bissau. To this aim I assessed the economic context of the two major ethnic groups in the region, the Beafada and the Balanta, in order to describe their livelihoods risks associated with living within the LCNP. Additionally, salient perceptions of the local people towards LCNP were evaluated for positive or negative valence in order to determine the costs and benefits associated with the formation of the Park for conservation purposes. Finally, perceptions and attitudes of wildlife by the local people were evaluated since negative or positive attitudes regarding wildlife may determine if there is the capacity for sustainability of the wild animals within the boundaries of LCNP.

7.1.1 Major goals of the protected area LCNP

LCNP attempts to protect biodiversity and simultaneously provide for peoples' livelihood and development needs. In order to fulfil this goal, the Park produces incentives – primarily economic - for local people to engage in pro-conservation behaviours, as well as, value and attitude change through environmental education implemented through meetings with the Park guards. LCNP faces enormous challenges regarding conservation of its remarkable biodiversity. The existence of two cities in the Park boundaries - Buba and Fulacunda - and a major road that crosses it places severe pressure on the Park territory and its non-human populations. People belonging to these two cities regularly come into the Park area, either to grow crops (food and *cash crops* such as cashew tree plantations) or to hunt. LCNP has hunting rules and biodiversity conservation actions near the local communities do take place. Guards sometimes confiscate weapons, mainly during the wet season (when it is forbidden to hunt). Families living inside the Park are allowed to hunt animals for personal consumption only. It is illegal to hunt for trade, especially animals that are larger than gazelles. Non-human primates, chimpanzee included, are also illegal to hunt. According to IBAP (2007), it is essential to adopt clear regulations prohibiting the transport of weapons by non-residents, as well as control mechanisms that prevent the bushmeat trade (locals included). The large road that crosses the LCNP allows hunters and others easy access to all Park areas to hunt restricted animals to satisfy urban consumers. Primates are a major target in the bushmeat trade: baboons, green monkeys and other are hunted even during the night (Casanova & Sousa, 2007). Deforestation and burning of the forest linked to agricultural

activities is also a main problem inside LCNP. Over-fishing is a problem that affects the Park, both in the freshwater lagoons (e.g. Cufada lagoon) and in Grande de Buba River. Although there are some controls, there is an excess use of gill nets which have an enormous impact on the capture of other animals beside fish, such as manatees. Timber extraction also affects the Park and although this problem has been controlled with some success in recent years, the pressure remains, particularly through the river Park access which allows for the illegal extraction of palm trees and African fan palms (IBAP, 2007).

LCNP has an operational Management Council, although there is only a provisional regulation used by the people who protected this area including the seven guards who work there. The provisional regulation still needs a legal revision to be conducted by the officer who is in charge of the approval and regulation of all legislation regarding Guinea-Bissau protected areas. According to information collected in the field, 2012/”013 may be the transitional years where the Park regulation will be approved.

7.1.2 Summary of findings regarding peoples' perceptions and attitudes towards LCNP

I) *Chapter 4 - Livelihoods and local economies*

In this Chapter the economic context of the two major ethnic groups, Beafada and Balanta, were assessed. It was important to assess the local economic context since I predicted that economic limitations and constraints on livelihoods imposed by the protected area will impact on attitudes towards wildlife and the Park itself. Cashew, dry and paddy rice were the major sources of income for the main ethnic groups of Beafada and Balanta. However, other activities were mentioned due to their economic value to villagers' livelihoods such as hunting, fishing, crop selling and other forest products (charcoal, palm oil). An important difference between these two ethnic groups is that Beafada men rely more on hunting (Muslins are heavy involved in the bushmeat trade) for cash than do the Balanta men (for more detailed information see Chapters 5 and 6). Although both ethnic groups are poor and disadvantaged economically, Beafada presented a higher household possessions score than the Balanta.

In terms of education, women in LCNP have fewer chances to attend school than do men, following the trend that the number of girls who abandoned education or never got the opportunity to go to school was higher than that for boys. Disparities and lack of opportunities for women are seen in all areas and sectors of the country (DENARP II, 2011). In terms of

health, almost no health care is provided by NGOs, the government or the Park itself in order to guarantee healthy pregnancies or healthy children. Appointments with doctors, medicines and transportations need to be paid for by the patients or by their families. Since financial constraints are the rule, life expectancy continues to be low (UNDP, 2006). These latter elements seem to be associated with the risk that men in particular have mentioned as their most significant concern. Women seem to be more concerned about the help that they believe, realistically or not, the LCNP or partner organizations potentially could provide to them in terms of field work equipment, such as ploughs, rice mills and palm oil presses. This belief is not surprising since women often complained about the amount of work that they have (inside the house and labour on fields). This Chapter has embraced poverty mapping in order to perceive the risks for both local populations, Beafada and Balanta, associated with living within a protected area. Both men and women have the perception that the Park should help them in the mentioned risks.

II) *Chapter 5 - Protected areas: How do local people see them?*

Here, reported perceptions of the local people towards the LCNP were evaluated. This evaluation was necessary in order to address hypotheses about how the operation of the LCNP area structures or underlies attitudes to conservation in the local area. The hypothesis that people who lose livelihoods as a result of constraints imposed by the protected area will hold negative values, perceptions and attitudes towards that same protected area (LCNP) was tested. In LCNP given the high level of reliance on forest resources by the local inhabitants, the formation of the Park has imposed considerable opportunity costs, notably reducing agriculture clearance, hunting access, with increasing crop-raiding consequences. Deforestation and forest burning are linked to agricultural activities particularly to some ethnic groups (such as the Beafada). The alternative to the *mpanpan* rice crops (rain fed rice) is the *bolanha* type of rice cultivation, or paddy rice. However, not every village inside the Park is located near wet and low land areas where it is possible to grow such rice crops fields (IBAP, 2007). When considering the opportunity costs of restricting hunting, the high level of illegal hunting conducted inside the Park means that opportunity costs were not fully imposed. It was clear from the survey questionnaire results, but particularly from the in-depth interviews to both men and women and Park guards, that there is still a large amount of illegal hunting activity within the Park's boundaries. Although trade in bushmeat is an illegal activity, hunting for the trade happens inside the Park as a source of income. Bushmeat trade occurs especially along the main roads or by boat with Bissau as their destination (Cá, 2008;

Casanova & Sousa, 2007; Gippoliti & Dell'Omo, 2003). Forbidding the trade in bushmeat may have caused some difficulties for households who were used to rely on this activity as an important source of income to buy rice and other products.

Restrictions on hunting and the increased number of animals in the crop fields - crop-raiding - has thus become a source of major concerns for both ethnic groups (Beafada and Balanta). Once the new hunting rules stopped people from killing monkeys, crop-raiding became central to perceptions of major constraints on people's livelihoods. According to people's testimonies (both ethnic groups and gender), wild animals seem to be less, but they constantly appear in their crops fields. Primates in particular pose severe problems as crop-raiders (Lee, 2010; Naughton-Treves et al., 1998; Newmark et al., 1994; Strum, 2010). Local people confirm this information, for them the worst crop-raiders are cane rats (rodents) and monkeys [patas monkeys, green monkeys, Campbell's monkeys and baboons in particularly (for more detailed information, see Chapter 6)].

Pfeffer and co-workers (2006) suggested that the inclusive National park model generates greater expectations of benefits on the part of local residents in an exclusionary "fortress" park model. The provision and support of community infrastructure such as schools and health centres within the LCNP can be considered to be a positive influence for livelihoods. However, as a direct alternative to hunting or agriculture appears to have been largely unsuccessful. In general, women from both ethnic groups have more negative perspectives about the Park than do men. Women felt that they have more restrictions now than ever before and they do not perceive of any benefits from the formation of the Park. Although both Beafada and Balanta men realized the importance of the Park for the preservation of natural resources and even agreed with it, they also felt that they do not have alternatives for the deforestation and hunting activities. Thus, differences in the reported perceptions of the local inhabitants towards the LCNP were more differentiated by gender (men and women) than by ethnicity (Beafada and Balanta).

III) *Chapter 6 – Perceptions of wildlife by local people*

In this Chapter the reported perceptions and attitudes of the local inhabitants towards wildlife in the LCNP were evaluated. Accessing local villagers' perceptions of wildlife was important for a better understanding of their attitudes towards wildlife in the Park.

During the attribution of biophilic values of nature (Kellert, 2009) by both ethnic groups, their choices of animals seemed very similar regarding the majority of values. Only in the attribution of the biophilic value utilitarian (*edible/not edible* trait) differences were more evident. Balanta are mainly non-Muslims and they do not have any external religious food restrictions. The animals that they pointed out as not edible were mainly due to the fact that these are not found in the forest or for sale (hyenas, snakes, pangolins and bush babies), with the exception of chimpanzees. Beafada are mainly Muslims and they do not eat pigs or monkeys (although they hunt them for sale), so they chose as edible all the other animals presented in the photographs, except for snakes and hyenas (who they considered too ugly and dangerous to hunt and consequently to eat). Gazelles seem to be the edible animal in common between the two ethnic groups, while chimpanzees and hyenas were the not edible animals. The case of the chimpanzee could be explained by the attribution of the biophilic values humanistic and symbolic (*more similar to people* trait) by both ethnic groups, which was expressed by the perception of the Balanta hunter interviewee where he explained that he could not kill chimpanzees because they want to preserve their families like humans. Also, chimpanzees did not damage the most frequently grown crops such as rice, maize or peanuts, or cashew plantations (see also Hockings & Sousa, 2011), which make the animal "more human" as in the case of the chimpanzee (Hill & Webber, 2010).

Baboons and cane rats were an example of not valued animals, particularly due to crop-raiding. However, it is not just the amount of damage animals' cause that determines the degree to which people view them negatively, the ways in which they are believed to behave is also determinant (Bennett & Ross, 2011; Hill & Webber, 2010; Lee & Priston, 2005; Webber et al., 2007). The effectiveness of species conservation efforts depends upon perceptions of the species (Kellert & Wilson, 1993) and in the case of the gazelles in terms of trait attribution gazelles were considered *pretty* (aesthetic value), *smart* (naturalistic value), *good* (moralistic value) and *edible* (utilitarian value), all considered as positive traits for local people. Gazelles were also considered as one of the least concerned crop-raiders. However, although gazelle were perceived as a highly "valued" animal this did not make people less likely to hunt it or to contribute to its conservation, since it is one of the most desired animals for sale and consumption by both ethnic groups. It seems though that positive perceptions do not always mean positive attitudes towards species conservation.

In terms of the assessed local knowledge this was greater for the gazelles – a highly "valued" animal - and baboons – a less "valued" animal - than it was for chimpanzees and cane rats, maybe due to a closer proximity and therefore greater experience with these animals. Gazelles and baboons were the most frequently hunted animals inside the Park. So knowledge seemed to play less of a role in engendering positive attitudes than did values (as humanistic and symbolic in the case of the chimpanzees). While the utilitarian and moralistic perceptions of species like gazelles were also positive, these perceptions did not make people less likely to hunt them or to contribute to their conservation. This combination of attitudes may pose the greatest risk to the species future. Unlike others primates, baboons appear firmly rooted within the role of pests and nothing more than a threat to people's livelihoods. Ethnicity produces different dynamics regarding wildlife as mentioned above, however the outcome for conservation is the same.

7.2 Recommendations for the LCNP future

When LCNP was created in 2000, several ethnic groups had been living in this area for generations prior to the establishment of the Park. Populations living inside the Park mainly rely on agriculture to feed their families and as their main source of income. Hunting and fishing provide the main livelihood sources of animal protein in this area, where domestic animal breeding has a very low expression. The harvest of natural products (oil, honey, charcoal, wood and other items) it is also important for the resident populations.

Presently, and according to this research, local people felt caught in a situation where they remain dependent as they were on forest resources, even while knowing that they can no longer exploit them as they used to before the Park´s formation; there are as yet no reliable alternatives to this dependency provided by the Park. These views highlight the need to consider the complexities and suitability of both the local population and development approaches when designing conservation projects. Without understanding how particular restrictions are functioning and impacting on local communities, it is impossible to evaluate their effectiveness, particularly with regards to poverty alleviation (Hodgkinson, 2009). Finding alternative solutions to the limitations imposed by the LCNP on economic activities and livelihoods will produce positive attitudes towards the protected area and conservation more generally. The provision and support of community infrastructure such as schools and health centres within the LCNP can be considered to be a positive influence for livelihoods. However, since these are both indirect and long-term benefits, they did not appear to be

associated with conservation efforts, particularly in light of their relatively small scale (Ferraro & Kiss, 2002; Wells et al., 1992). Solutions need to be local and emergent – these have to incorporate local inhabitants' needs into effective action that returns the biodiversity "values" back to local communities. Local solution to local livelihoods constraints must come through the understanding between Park managers and local villagers; however, financial support could not come from the Park but from other sources (e.g. NGO's, State).

LCNP has been guarded by a team of seven guards since its formation in 2000. According to Park guards' perceptions, people seem to accept the life inside the Park and believe that the forest and wildlife in it will continue to exist in the future with the contribution of all. However, all Park guards recognized major difficulties in accomplishing such goals. During the interviews Park guards were asked, about their main concerns regarding Park's management in finding alternatives for hunting and deforestation due to farm clearance; because although trade in bushmeat is an illegal activity, hunting for trade happens inside the Park as a source of income. According to them a strengthen surveillance and reinforcement of the law is necessary and for that: i) the number of guards has to increase, ii) the schedule from 16h to 8h should also be fulfil and not only the one from 8h/16h and, iii) although all of them have a salary, transport and equipment improvements must be provided. I agree with the mentioned alternatives from the Park guards, the number of guards is clearly insufficient for the Park´s area particularly for the effective control of wood exploitation, cashew plantations, uncontrolled burns and hunting of all types of animals (medium, large) during all seasons for bushmeat or pet trade (see Plate 7.2).

Plate 7.2: Patas monkey as a *pet* in Nhala village.

More opportunities for cropping paddy rice (*bolanhas*) instead of dry rice (*mpanpan*) should also be provided, as well as the reinforcement of the law combined with local people´s conscious of the damages caused by the uncontrolled fires and timber extraction practices that annually destroy a significant area of the original vegetation. Economic alternatives to the dramatic and unregulated increase in cashew plantations are also needed. Although, the Park produces incentives for local people to engage in pro-conservation behaviours, as well as, value and attitude change through environmental education implemented through meetings with the Park guards, behaviours should be reinforced including that for primary kids, adult men and women (see Hambler, 2004; Hill, 1998). By vastly improving education for primary kids, future adults will show more concern for their environment than their parents have done, by changing their attitudes and behaviours regarding environmental conservation. Local people must become more aware of the serious repercussions of both forest clearance and wildlife extinction for their livelihoods and the world itself, that actions have consequences, not to mentioned repercussions for the wildlife itself. Furthermore, it seems important to implement a women's empowerment programme combining social, economic, political, legal and environmental dimensions (Flinton, 2003). Educated girls have a wide-ranging positive impact on the health and economic success of their communities. Women could increase their capacities for secure and enhanced income and greater participation, voice and decision making in local development. The economic empowerment strategy could involve training in

skills, financial literacy and entrepreneurship with linkages established to value chain and market instruments. Women's leadership could be nurtured so that they can play a more active role in domestic and public spheres.

Conservation education initiatives with the aim of promoting more positive attitudes are also crucial in increasing local tolerance toward target species (Hill, 2005; Lee & Priston, 2005; Osborn & Hill, 2005). Negative attitudes regarding wildlife are a function of the degree of contact with species as pests (Bennett & Ross, 2011; Gillingham & Lee, 1999; Hill, 2005; Lee & Priston, 2005) particularly when farmers engage in market economy, perceptions of the damage caused by crop raiding tended to be worst (Lee & Priston, 2005; Naughton-Treves, 1997). Furthermore, it is not uncommon to find that negative perceptions expressed on surveys are not consistent with realities on the ground (Bennett & Ross, 2011; Gillingham & Lee, 2003; Hill, 1997; Naughton-Treves, 1997; Priston, 2001). Unlike others primates, baboons appear firmly rooted with the role of pests and nothing more than a threat to people's livelihoods. Strategies in order to reduce the conflict between species and local people should also be implemented after an assessment of the real problem, not only based on perceptions that not always reflect the real problem. For those primate species, which have been reduced to a few isolated populations due to human activities and anthropogenic habitat changes, there are only two options: (a) multi-use areas, with realistic and recognised buffer zones and refuge areas large enough to accommodate their populations or, (b) enable primates to live alongside the human populations which occupy and exploit their habitats without direct hostile interactions (Lee, 2010; Priston et al., 2012). It would also be important if local people develop their own strategies to avoid crop-raiding (Osborn & Hill, 2005) – non-lethal methods are preferable – and thus to become independent from a compensation culture (Ferraro & Kramer, 2002; Thirgood, Woodroffe & Rabinowitz, 2005).

Furthermore the increase of the raising and consumption of domestic animals (goats, chickens, pigs and cows) for household consumption and as a source of income as an alternative to the bushmeat consumption and trade, financially supported by the FIAL, should continue. The trade of these animals is limited by comparison with the bushmeat trade. Some livestock animals are more expensive than bushmeat, particularly if people sell them outside the Park's boundaries. Finally, community should be involve in the conservation of their own territory, through the opportunity of create new jobs. Long term research or conservation programmes should always evolve the community. The construction of a harbour for bauxite

that was supposed to create jobs for local people until now has only destroyed one third of the Park´s vegetation. Actions like this one should be forbidden from happenning in the future.

7.2 Future work

During both the fieldwork and the writing of my thesis, a number of areas that demanded development or further exploration were uncovered. So, I would like to suggest future work ideas regarding areas that have not been well explored and are considered important for the subject LCNP future. These are outlined below:

a) The choice of studying the two most representative ethnic groups living within the LCNP - the Beafada and the Balanta - allowed for comparison between two different cultures and life stories as well as the understanding of how these cultural differences relate to attitudes regarding LCNP conservation. However, in order to improve the knowledge about the population living inside the LCNP the other ethnic groups should also be studied in the future [Fula (3.6%); Manjaco (3.6%); Pepel (2.6%); and Bijagó, Mandiga, Mancanha combined at (4.1%)]. It seems important to differentiate the roles of each ethnic group inside the Park regarding subjects as wood exploration, bushmeat hunting for trade or consumption and unsustainable farming practices.

b) Economic differences between all ethnic groups should also be explored in order to understand the differences and the reasons beneath them. Although in this thesis I have assessed about the economic context of the most representative ethnic groups in the Park and associate the economics of livelihoods with local inhabitants' attitudes towards conservation and the protected area, this subject needs to be explored in more detail including research data from the other ethnic groups inside LCNP. This study has embraced poverty mapping in order to perceive the risks for both local populations, Beafada and Balanta, associated with living within a protected area, but it would be interesting to demonstrate if there is a causal link between protection and poverty (de Sherbinin, 2008; Upton et al., 2008; Wittemeyer, 2008) related to the people living inside LCNP by comparing their livelihoods with the ones who live outside the Park.

c) The failure of the local people to trade significant quantities of alternatives to forest meat, such as domestic animals is not quite understandable, since some livestock animals are more expensive than bushmeat, particularly if people sell them outside the Park's boundaries. Maybe this message is not being transmitted clearly or the opportunities for raising domestic animals (goats, chickens, pigs and cows) as an alternative to the bushmeat consumption and trade are not being effective. Further work should be conducted on developing access to such alternatives. This would include investigating options and understand the reasons why local people seem resilient to this option.

d) As mentioned above, negative attitudes are a function of the degree of contact with species as pests (Bennett & Ross, 2011; Gillingham & Lee, 1999; Hill, 2005; Lee & Priston, 2005) particularly when farmers engage in market economy, perceptions of the damage caused by crop raiding tended to be worst (Lee & Priston, 2005; Naughton-Treves, 1997). It is not uncommon to find that negative perceptions expressed on surveys are not consistent with realities on the ground (Bennett & Ross, 2011; Gillingham & Lee, 2003; Hill, 1997; Naughton-Treves, 1997; Priston, 2001). So it seems very important that the implemented strategies in order to reduce the conflict between species and local people should happen after an assessment of the real problem, not only based on perceptions that not always reflect the real problem regarding the dimension of the loss and the real troublesome animals responsible for it.

e) Finally, since differences in the reported perceptions of the local inhabitants towards the LCNP were more differentiated by gender (men and women) than by ethnicity (Beafada and Balanta), it seems very important the continue study of the differences between genders when studying other ethnic groups.

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Appendix 1

Questionnaire nº: _____ **Date:** __/__/__

I – Economic Information:

1. Which kind of job pays more money to your family? (point the 3 main for order of importance: pábi, mpanpan, chabéu cutting, bolanha de lála, bolanha de tarrafe, caju, fishing, hortas, trade, etc.)

1º _____ 2º_____ 3º_____

2. Where do you get most of the food for you and your family? (point the 3 main starting with the most important)

2.1 Is purchased_____
2.2 Is hunted_____
2.3 Is grown_____
2.4 Another source_____ Which?
_____

3. What´s the most common work amongst your family? (point the activity which spend most of the time: agriculture, pastoral, fishing, cultivate, hunting, etc.)

_____

4. Which domestic animals does your family have? (point the 3 main, starting with the animal in greater number)

1º _____ 2º_____ 3º_____

5. Do you know if your tabanca is part of the Cufada Park?

5.1 Yes_____
5.2 No_____
5.3 I don`t know____

6. Do you know if your garden is part of the Cufada Park?

6.1 Yes _____
6.2 No_____
6.3 I don`t know____

7. What do you know about Cufada`s bush?

_____

II – Religious Beliefs:

8. Are there any sacred bushes in this tabanca?

8.1 Yes___
8.2 No___ (GO TO QUESTION 10)
8.3 I don`t know___ (GO TO QUESTION 10)

9. Do you know why those bushes are sacred?

_____

10. Which of the tabancas`s celebrations take place in the bush?

_____

III – Socio-zoological scales

11. Of all the animals that exist in this bush tell me:

11.1 Which ones do you most like to see? _____

11.1.1 Why? _____

11.2 Which ones do you less like to see? _____

11.1.2 Why? _____

12. Of the following animals, tell me: (Show all the cards and put only the number of the photo identification on the formulary).

12.1) 3 animals that are "good" (starting with the best of all).	1º_____ 2º_____ 3º_____
12.2) 3 animals that are "bad" (starting with the worst of all).	1º_____ 2º_____ 3º_____
12.3) The 3 prettiest (starting with the prettiest).	1º_____ 2º_____ 3º_____
12.4) The 3 ugliest (starting with the ugliest).	1º_____ 2º_____ 3º_____
12.5) The 3 smartest (starting with the smartest one).	1º_____ 2º_____ 3º_____
12.6) The 3 less smartest (starting with the less smart of all).	1º_____ 2º_____ 3º_____
Show just non domestically animals cards 12.7) 3 edible animals (starting with the most appreciated animal of all).	1º_____ 2º_____ 3º_____
12.8) 3 not-edible animals (starting with the one you would never eat, even if your where starving to death).	1º_____ 2º_____ 3º_____

12.9) More similar to people (starting with the closest of all).	1º_____ 2º_____ 3º_____
12.10) Which are the animals that you see more times (starting with the one you see more).	1º_____ 2º_____ 3º_____
12.11) Which are the animals that you see less times (starting with the one you see less).	1º_____ 2º_____ 3º_____

13. If God said that you couldn`t be a person, which of these animals would you prefer to be?

_____

14. And which you didn`t want to be?

_____

15. Have you ever take care of any of these animals? (Show <u>just</u> non human primate cards)

13.1 Yes _____ Which?
_____

13.2 No_____ (GO TO QUESTION 19)

16. Where did you get these animals? _____

17. For how long did they stay with you? _____

18. After being with you, what happened to them? _____

19. Do you think that the bush will exist forever?

19.1 Yes_____

19.2 No_____

19.3 I don`t know_____

19.4 Why? _____

20. Do you think that the animals of the bush will exist forever?

20.1 Yes_____

20.2 No_____
20.3 I don`t know_____

20.4 Why? _____

IV – Hunting and feeding habits:

21. Which food do you buy at the boutique? _____

22. Are there any hunters in this tabanca?
    22.1 Yes___
    22.2 No___ (GO TO QUESTION 27)
    22.3 I don`t know____ (GO TO QUESTION 27)

23. Why do hunters hunt? (Know why they hunt: for eat/sale)
_____

24. How many times do they hunt?
_____

25. Which animals are hunted by the hunters of the tabanca?
_____

26. Which tools do they use for hunting? _____

27. Do you know anyone using snares/traps?
    27.1 Yes___
    27.2 No___ (GO TO QUESTION 29)
    27.3 I don`t know___ (GO TO QUESTION 29)

28. Which are the most trapped animals?
_____

29. From all the animals in the bush, which are the ones that are never hunted?
_____

29.1Why? _____

30. From all the animals in the bush, which are the ones that people never eat?
_____

30.1Why? _____

31. Which are the animals from the bush that your family usually buys?
_____

31.1 Why? _____

V –Expectations regarding the following scenario:

Construction of a guesthouse near the tabanca, where the guests would be staying. These people would use the tabanca to obtain food and local crafts. However, their presence would mean a greater conservation of the bush in terms of the prohibition and control of hunting, farming and slash-and-burn practices.

32. In your opinion, how would you feel about this situation?

    32.1 It would be good _____

    32.2 It would be the same _____

    32.3 It would be bad _____

    32.4 I don´t know _____

32.5 Why? _____

VI – Personal attributes:

33. Gender:

33.1 Male_____

33.2 Female_____

34. Age (approx.) _____

35. How many people live in your house? _____

36. Are there only relatives or also friends living in your house?

36.1 Just relatives _____

36.2 Relatives and friends _____

37. How many children do you have? _____

38. How many women do you have? If is a woman: how many women does your husband have? _____

39. Did you attend school?

39.1 Yes _____

How long did you attend school? _____

39.2 No _____ (GO TO QUESTION 41)

40. What kind of school did you attend?

40.1 Normal school _____

40.2 Madrassa (School where they learn the Alcorão) _____

40.3 I don`t know_____

41. Do you have a zinc roof?

41.1 Yes___
41.2 No___

42. Do you have a radio?

42.1 Yes___
42.2 No___

43. Do you have a flashlight?

43.1 Yes___
43.2 No___

44. Do you have a bike?

44.1 Yes___
44.2 No___

45. Do you have a mobile phone?

45.1 Yes___
45.2 No___

46. What´s your religion? _____

47. Tabanca: _____

48. Ethnic group: _____

49. Sector: _____

50. Region: _____

Appendix 2

Script for the Park guards interviews

I – To understand the work of the park guards

1.1 Could you tell me how a working day is? What do you usually do in a working day? ☐

1.2 When you are working in the villages what do you do? ☐

II – Information on the use of bush by the locals

2.1 What do you know about the lands that are used for cultivation? ☐

2.2 How is the distribution of land made? ☐

III – Information about the local hunting and food habits

3.1 What do you know about the hunting inside the Park? ☐

3.2 Are there hunters in the villages? ☐ (in case of a "no" answer skip to topic 3.5)

3.3 What do they hunt? ☐

3.4 How many times *per* week? ☐

3.5 What do locals most eat? ☐

3.6 Which meat do they eat more often? ☐

IV – Bush conservation and its perception

4.1 Will the bush and the animals last forever? ☐

4.2 What would you change in your work to make it last forever? ☐

V – Personal attributes:

Age: _____ Gender: _____ Level of education: _____

Religion: _____

Tabanca: _____

Ethnic group: _____

Sector: _____

Region: _____

Appendix 3

Scrip for the men's of the Park interviews

(régulo/tabancas`s chief, hunters and others)

I – Perceptions about the tabanca

1.1 What worries you most?

1.1.1 Education ☐

1.1.2 Health ☐

1.1.3 Mobility/Transportation ☐

1.2 In your opinion, what is missing in the tabanca?

II – Economic information

2.1 How do you earn your money? ☐

2.2 How do you spend your money? ☐

III – Information on the use of bush

3.1 Where do you get most of the food for you and your family? ☐

3.2 What do you know about the lands that are use for cultivation? ☐

3.3 How long do you have your horta/lugar? To whom does it belong? To whom did you ask for permission to cultivate? ☐

IV – Hunting and food habits:

4.1 What do locals most eat? ☐

4.2 Do you like meat? ☐

4.3 Which is the meat that you most eat? ☐

4.4 Are there hunters in the tabancas? ☐

4.5 What do they hunt? Do they use snares/trapes? ☐

4.6 How many times *per* week? ☐

V – Perception of bush conservation

5. 1 Will the bush and the animals last forever? ☐

5.2 What would you change in your daily life to make it last forever? ☐

VI – Personal attributes

Age: _____ Gender: _____ Level of Education: _____

Religion: _____

Village: _____

Ethnic group: _____

Sector: _____

Region: _____

Appendix 4

Script for the women's of the Park interviews

(Focus-Groups)

I – Perceptions of the tabanca:

1.1 Please, describe your day.

1.2. Which are your biggest problems?

1.2.1 Education ☐

1.2.2 Health ☐

1.2.2.1 Problems with pregnant women/mothers ☐

1.2.2.2 Problems with babies' health ☐

1.2.3 Mobility/Transportation ☐

II – Perceptions of themselves as women and mothers

2.1 As mothers, what kind of help would you like to have?

III – Economic Information:

3.1 How do you earn your money? ☐

3.2 How do you spend your money? ☐

IV – Perceptions of the bush animals:

4.1 Do the animals bring you problems? ☐

V – Hunting and food habits:

4.1 What do locals most eat? ☐

4.2 Do you like meat? ☐

4.3 Which is the meat that you most eat? ☐

4.4 Are there hunters in the tabancas? ☐

4.5 What do they hunt? Do they use snares/trapes? ☐

4.6 How many times *per* week? ☐

VI – Perception of the bush conservation:

6. 1 Will the bush and the animals last forever? ☐

6.2 What would you change in your work to make it last forever? ☐

VII – Expectations regarding the interviewer:

7.1 What do you think about me? ☐

7.2 In your opinion, what is missing in the tabanca? ☐

VIII – Data of the focus-group

Nº women: _____

Religion: _____

Tabanca: _____

Ethnic group: _____

Sector: _____

Region: _____

Appendix 5

Local knowledge interview script for the Park´s men and women

Men [Individual N=15 Beafada and N=15 Balanta (village`s chief, hunters and others)]

Women (Individual N=15 Beafada and N=15 Balanta)

I – Traditional Ecological Knowledge (TEK):

1. Perceptions about the animals and plants in the cards:
   Chimpanzee (*Pan troglodytes verus*);
   Gazelle (*Gazella rufifrons*);
   Baboon (*Papio papio)*;
   Cane rat (*Thryonomys swinderianus*);
   Palm tree (*Elaeis guineensis*);
   African fan palm (*Parinari excelsa sabine*).

1.1 What do you know about this animal/plant?

(Open question where they can explain with their own words and concepts the animal or plant in the card. The learning of their own words and concepts towards some animals/plants will probably increase the success of an educational/conservational approach in schools.)

II – Scientific Knowledge:

2.1 Questions related to the knowledge of the interviewed of the animals/plant:

Chimpanzee

	True	False
1. These animals live alone.	○	○
2. These animals live in the bush.	○	○
3. They have more than one baby at a time.	○	○
4. They live as long as people.	○	○
5. They sleep in the trees.	○	○
6. They eat fruits.	○	○
7. They are eaten by leopards.	○	○

Gazelle

	True	False
1. They live alone.	○	○
2. They live in the bush.	○	○
3. They live as long as people.	○	○
4. They have more than one baby at a time.	○	○
5. They sleep at the ground in bushes.	○	○
6. They eat fruits.	○	○
7. They are eaten by leopards.	○	○

Baboon

	True	False
1. They live alone.	○	○
2. They live in the bush.	○	○
3. They live as long as people.	○	○
4. They have more than one baby at a time.	○	○
5. They sleep in trees.	○	○
6. They eat fruits.	○	○
7. They are eaten by leopards.	○	○

Cane rat

	True	False
1. They live alone.	○	○
2. They live in the bush.	○	○
3. They live as long as people.	○	○
4. They have more than one baby at a time.	○	○
5. They sleep in trees.	○	○
6. They eat fruits.	○	○
7. They are eaten by leopards.	○	○

Palm tree

	True	False
1. They were planted by the old ones.	○	○
2. Fruits are eaten only by people.	○	○
3. They have many seedlings.	○	○
4. They make fruits only once per year.	○	○
5. Many animals use them.	○	○
6. The leaves grow back when we cut them.	○	○
7. They live longer than people.	○	○

African fan palm

	True	False
1. They were planted by the old ones.	○	○
2. Fruits are eaten only by people.	○	○
3. They have many seedlings.	○	○
4. They make fruits only once per year.	○	○
5. Many animals use them.	○	○
6. The leaves grow back when we cut them.	○	○
7. They live longer than people.	○	○

(This knowledge will provide us a comparison between the knowledge of the interviewed and the scientific literature. Now we have access to their words and concepts use in the description of what they feel and know about the animals/plant presented in the cards and we could also at the same time have an idea of the level of that knowledge through these 7 true/false questions.)

III – Address attitudes towards the conservation of the animals in the cards (show the cards and people have to choose if none, 1, 2 or all 4 animals' feet in the answer):

	Chimpanzee	**Gazelle**	**Baboon**	**Cane rat**
1. Where I live there are plenty of these animals.	○	○	○	○
2. This animal eats my crops because they don't have food in other place of the Park.	○	○	○	○
3. When I see this animal I feel so angry that I want to kill it.	○	○	○	○
4. This animal eats my crops because he´s bad.	○	○	○	○
5. I do not care if this animal disappears from the Park.	○	○	○	○
6. This animal is never hunted by men.	○	○	○	○
7. I want that this animal continue to exist in the Park.	○	○	○	○
8. This animal could disappear because of the hunting made by men.	○	○	○	○
9. There is enough space in this Park for him to live.	○	○	○	○

[1]The answers to these statements could be: chimpanzees and/or gazelles and/or baboons and/or cane rats or not any.

IV – Personal attributes

Age: _____ Gender: _____ Level of Education: _____

Religion: _____

Village: _____

Ethnic group: _____

Sector: _____

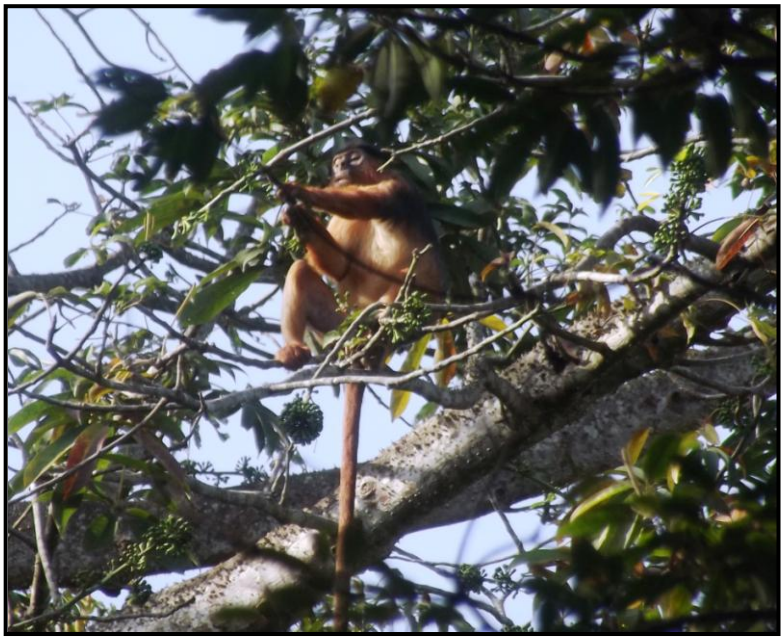
Region: _____

Appendix 6

Photos of the Animals used during data collection

Chimpanzee (*Pan troglodytes verus*)

Western Black-and-white colobus (*Colobus polykomos*)



Western Red colobus (*Procolobus badius temminckii)*

Campbell's monkey (*Cercopithecus campbelli)*

Baboon (*Papio papio*)

Patas monkey (*Erythrocebus patas*)

Sooty mangabey (*Cercocebus atys*)

Green monkey (*Chlorocebus sabaeus*)

Bush baby (*Galago senegalensis*)

Lesser Spot-nosed monkey (*Cercopithecus petaurista*)

Capuchin monkey (*Cebus capucinus*)

Roan Antelope (*Hippotragus equinus*)

Gazelle (*Gazella rufifrons*)

Pangolin (*Manis tetradactyla*)

Hyena (*Crocuta crocuta*)

Abyssinian ground-hornbill (*Bucorvus abyssinicus*)

Mudskipper (*Periophthalmus argentilineatus*)

Turtle (*Kinixys belliana nogueyi*)

Butterfly (*Brephidium* species)

Purple glossy starling (*Lamprotornis purpureus*)

Snake (*Pyton sebae*)

African honey bee (*Apis mellifera scutellata*)

Chicken (*Gallus gallus domesticus*)

Cow (*Bos primigenius*)

Pig (*Sus scrofa scrofa*)

Goat (*Capra aegagrus hircus*)

Appendix 7

Photos of the Animals/Plants used during local knowledge data collection

Chimpanzee (*Pan troglodytes verus*)

Baboon (*Papio papio*)

Gazelle (*Gazella rufifrons*)

Cane rat (*Thryonomys swinderianus)*

Palm tree (*Elaeis guineensis*)

Africa fan palm (*Parinari excelsa sabine*)

Appendix 8

Local knowlodge data collection

						Count	Subtable Valid N %
Ethnic Group	Beafada	Gender	Female	These animals live alone. Chimpanzee	True	1	6.7%
					False	14	93.3%
				These animals live alone. Cane rat	True	0	.0%
					False	15	100.0%
				These animals live alone. Baboon	True	0	.0%
					False	15	100.0%
				These animals live alone. Gazelle	True	15	100.0%
					False	0	.0%
			Male	These animals live alone. Chimpanzee	True	0	.0%
					False	15	100.0%
				These animals live alone. Cane rat	True	0	.0%
					False	15	100.0%
				These animals live alone. Baboon	True	0	.0%
					False	15	100.0%
				These animals live alone. Gazelle	True	12	80.0%
					False	3	20.0%
	Balanta	Gender	Female	These animals live alone. Chimpanzee	True	0	.0%
					False	15	100.0%
				These animals live alone. Cane rat	True	2	13.3%
					False	13	86.7%
				These animals live alone. Baboon	True	1	6.7%
					False	14	93.3%
				These animals live alone. Gazelle	True	12	80.0%
					False	3	20.0%
			Male	These animals live alone. Chimpanzee	True	1	6.7%
					False	14	93.3%
				These animals live alone. Cane rat	True	3	20.0%
					False	12	80.0%
				These animals live alone. Baboon	True	0	.0%
					False	15	100.0%
				These animals live alone. Gazelle	True	14	93.3%
					False	1	6.7%

						Count	Subtable Valid N %
Ethnic Group	Beafada	Gender	Female	They live in the bush. Cane rat	True	15	100.0%
					False	0	.0%
				They live in the bush. Chimpanzee	True	15	100.0%
					False	0	.0%
				They live in the bush. Gazelle	True	15	100.0%
					False	0	.0%
				They live in the bush. Baboon	True	15	100.0%
					False	0	.0%
			Male	They live in the bush. Cane rat	True	14	93.3%
					False	1	6.7%
				They live in the bush. Chimpanzee	True	15	100.0%
					False	0	.0%
				They live in the bush. Gazelle	True	14	93.3%
					False	1	6.7%
				They live in the bush. Baboon	True	15	100.0%
					False	0	.0%
	Balanta	Gender	Female	They live in the bush. Cane rat	True	15	100.0%
					False	0	.0%
				They live in the bush. Chimpanzee	True	15	100.0%
					False	0	.0%
				They live in the bush. Gazelle	True	15	100.0%
					False	0	.0%
				They live in the bush. Baboon	True	15	100.0%
					False	0	.0%
			Male	They live in the bush. Cane rat	True	15	100.0%
					False	0	.0%
				They live in the bush. Chimpanzee	True	15	100.0%
					False	0	.0%
				They live in the bush. Gazelle	True	15	100.0%
					False	0	.0%
				They live in the bush. Baboon	True	15	100.0%
					False	0	.0%

						Count	Subtable Valid N %
Ethnic Group	Beafada	Gender	Female	They live as long as people. Cane rat	True	11	73.3%
					False	4	26.7%
				They live as long as people. Chimpanzee	True	2	13.3%
					False	13	86.7%
				They live as long as people. Baboon	True	4	26.7%
					False	11	73.3%
				They live as long as people. Gazelle	True	2	13.3%
					False	13	86.7%
			Male	They live as long as people. Cane rat	True	15	100.0%
					False	0	.0%
				They live as long as people. Chimpanzee	True	3	20.0%
					False	12	80.0%
				They live as long as people. Baboon	True	4	26.7%
					False	11	73.3%
				They live as long as people. Gazelle	True	2	13.3%
					False	13	86.7%
	Balanta	Gender	Female	They live as long as people. Cane rat	True	11	73.3%
					False	4	26.7%
				They live as long as people. Chimpanzee	True	1	6.7%
					False	14	93.3%
				They live as long as people. Baboon	True	0	.0%
					False	15	100.0%
				They live as long as people. Gazelle	True	2	13.3%
					False	13	86.7%
			Male	They live as long as people. Cane rat	True	13	86.7%
					False	2	13.3%
				They live as long as people. Chimpanzee	True	3	20.0%
					False	12	80.0%
				They live as long as people. Baboon	True	2	13.3%
					False	13	86.7%
				They live as long as people. Gazelle	True	4	26.7%
					False	11	73.3%

						Count	Subtable Valid N %
Ethnic Group	Beafada	Gender	Female	They have more than one baby at a time. Cane rat	True	0	.0%
					False	15	100.0%
				They have more than one baby at a time. Chimpanzee	True	15	100.0%
					False	0	.0%
				They have more than one baby at a time. Gazelle	True	0	.0%
					False	15	100.0%
				They have more than one baby at a time. Baboon	True	0	.0%
					False	15	100.0%
			Male	They have more than one baby at a time. Cane rat	True	0	.0%
					False	15	100.0%
				They have more than one baby at a time. Chimpanzee	True	15	100.0%
					False	0	.0%
				They have more than one baby at a time. Gazelle	True	0	.0%
					False	15	100.0%
				They have more than one baby at a time. Baboon	True	3	20.0%
					False	12	80.0%
	Balanta	Gender	Female	They have more than one baby at a time. Cane rat	True	0	.0%
					False	15	100.0%
				They have more than one baby at a time. Chimpanzee	True	15	100.0%
					False	0	.0%
				They have more than one baby at a time. Gazelle	True	0	.0%
					False	15	100.0%
				They have more than one baby at a time. Baboon	True	1	6.7%
					False	14	93.3%
			Male	They have more than one baby at a time. Cane rat	True	0	.0%
					False	15	100.0%
				They have more than one baby at a time. Chimpanzee	True	15	100.0%
					False	0	.0%
				They have more than one baby at a time. Gazelle	True	1	6.7%
					False	14	93.3%
				They have more than one baby at a time. Baboon	True	4	26.7%
					False	11	73.3%

						Count	Subtable Valid N %
Ethnic Group	Beafada	Gender	Female	They sleep in the trees. Chimpanzee	True	14	93.3%
					False	1	6.7%
				They sleep in the trees. Baboon	True	15	100.0%
					False	0	.0%
				They sleep in the trees. Cane rat	True	0	.0%
					False	15	100.0%
				They sleep in the trees. Gazelle	True	0	.0%
					False	15	100.0%
				They sleep in the trees. Gazelle	True	0	.0%
					False	15	100.0%
			Male	They sleep in the trees. Chimpanzee	True	14	93.3%
					False	1	6.7%
				They sleep in the trees. Baboon	True	14	93.3%
					False	1	6.7%
				They sleep in the trees. Cane rat	True	0	.0%
					False	15	100.0%
				They sleep in the trees. Gazelle	True	0	.0%
					False	15	100.0%
				They sleep in the trees. Gazelle	True	0	.0%
					False	15	100.0%
	Balanta	Gender	Female	They sleep in the trees. Chimpanzee	True	15	100.0%
					False	0	.0%
				They sleep in the trees. Baboon	True	15	100.0%
					False	0	.0%
				They sleep in the trees. Cane rat	True	0	.0%
					False	15	100.0%
				They sleep in the trees. Gazelle	True	0	.0%
					False	15	100.0%
				They sleep in the trees. Gazelle	True	0	.0%
					False	15	100.0%
			Male	They sleep in the trees. Chimpanzee	True	14	93.3%
					False	1	6.7%
				They sleep in the trees. Baboon	True	15	100.0%
					False	0	.0%
				They sleep in the trees. Cane rat	True	0	.0%
					False	15	100.0%
				They sleep in the trees. Gazelle	True	0	.0%
					False	15	100.0%
				They sleep in the trees. Gazelle	True	0	.0%
					False	15	100.0%

						Count	Subtable Valid N %
Ethnic Group	Beafada	Gender	Female	They eat fruits. Gazelle	True	7	46.7%
					False	8	53.3%
				They eat fruits. Baboon	True	15	100.0%
					False	0	.0%
				They eat fruits. Chimpanzee	True	15	100.0%
					False	0	.0%
				They eat fruits. Cane rat	True	5	33.3%
					False	10	66.7%
			Male	They eat fruits. Gazelle	True	10	66.7%
					False	5	33.3%
				They eat fruits. Baboon	True	14	93.3%
					False	1	6.7%
				They eat fruits. Chimpanzee	True	12	80.0%
					False	3	20.0%
				They eat fruits. Cane rat	True	10	66.7%
					False	5	33.3%
	Balanta	Gender	Female	They eat fruits. Gazelle	True	5	33.3%
					False	10	66.7%
				They eat fruits. Baboon	True	12	80.0%
					False	3	20.0%
				They eat fruits. Chimpanzee	True	9	60.0%
					False	6	40.0%
				They eat fruits. Cane rat	True	6	40.0%
					False	9	60.0%
			Male	They eat fruits. Gazelle	True	9	60.0%
					False	6	40.0%
				They eat fruits. Baboon	True	14	93.3%
					False	1	6.7%
				They eat fruits. Chimpanzee	True	11	73.3%
					False	4	26.7%
				They eat fruits. Cane rat	True	9	60.0%
					False	6	40.0%

						Count	Subtable Valid N %
Ethnic Group	Beafada	Gender	Female	They are eaten by leopards. Gazelle	True	10	66.7%
					False	5	33.3%
				They are eaten by leopards. Cane rat	True	12	80.0%
					False	3	20.0%
				They are eaten by leopards. Baboon	True	0	.0%
					False	15	100.0%
				They are eaten by leopards. Chimpanzee	True	0	.0%
					False	15	100.0%
			Male	They are eaten by leopards. Gazelle	True	13	86.7%
					False	2	13.3%
				They are eaten by leopards. Cane rat	True	14	93.3%
					False	1	6.7%
				They are eaten by leopards. Baboon	True	3	20.0%
					False	12	80.0%
				They are eaten by leopards. Chimpanzee	True	1	6.7%
					False	14	93.3%
	Balanta	Gender	Female	They are eaten by leopards. Gazelle	True	14	93.3%
					False	1	6.7%
				They are eaten by leopards. Cane rat	True	6	40.0%
					False	9	60.0%
				They are eaten by leopards. Baboon	True	0	.0%
					False	15	100.0%
				They are eaten by leopards. Chimpanzee	True	0	.0%
					False	15	100.0%
			Male	They are eaten by leopards. Gazelle	True	14	93.3%
					False	1	6.7%
				They are eaten by leopards. Cane rat	True	9	60.0%
					False	6	40.0%
				They are eaten by leopards. Baboon	True	2	13.3%
					False	13	86.7%
				They are eaten by leopards. Chimpanzee	True	0	.0%
					False	15	100.0%

						Count	Subtable Valid N %
Ethnic Group	Beafada	Gender	Female	They were planted by the old ones. Palm Tree	True	1	6.7%
					False	14	93.3%
				They were planted by the old ones. African fan palm	True	1	6.7%
					False	14	93.3%
			Male	They were planted by the old ones. Palm Tree	True	4	26.7%
					False	11	73.3%
				They were planted by the old ones. African fan palm	True	4	26.7%
					False	11	73.3%
	Balanta	Gender	Female	They were planted by the old ones. Palm Tree	True	1	6.7%
					False	14	93.3%
				They were planted by the old ones. African fan palm	True	1	6.7%
					False	14	93.3%
			Male	They were planted by the old ones. Palm Tree	True	0	.0%
					False	15	100.0%
				They were planted by the old ones. African fan palm	True	0	.0%
					False	15	100.0%

						Count	Subtable Valid N %
Ethnic Group	Beafada	Gender	Female	Fruits are eaten only by people. Palm Tree	True	3	20.0%
					False	12	80.0%
				Fruits are eaten only by people. African fan palm	True	3	20.0%
					False	12	80.0%
			Male	Fruits are eaten only by people. Palm Tree	True	1	6.7%
					False	14	93.3%
				Fruits are eaten only by people. African fan palm	True	2	13.3%
					False	13	86.7%
	Balanta	Gender	Female	Fruits are eaten only by people. Palm Tree	True	0	.0%
					False	15	100.0%
				Fruits are eaten only by people. African fan palm	True	0	.0%
					False	15	100.0%
			Male	Fruits are eaten only by people. Palm Tree	True	0	.0%
					False	15	100.0%
				Fruits are eaten only by people. African fan palm	True	2	13.3%
					False	13	86.7%

						Count	Subtable Valid N %
Ethnic Group	Beafada	Gender	Female	They have many seedlings. African fan palm	True	15	100.0%
					False	0	.0%
				They have many seedlings. Palm Tree	True	15	100.0%
					False	0	.0%
			Male	They have many seedlings. African fan palm	True	15	100.0%
					False	0	.0%
				They have many seedlings. Palm Tree	True	15	100.0%
					False	0	.0%
	Balanta	Gender	Female	They have many seedlings. African fan palm	True	15	100.0%
					False	0	.0%
				They have many seedlings. Palm Tree	True	15	100.0%
					False	0	.0%
			Male	They have many seedlings. African fan palm	True	15	100.0%
					False	0	.0%
				They have many seedlings. Palm Tree	True	15	100.0%
					False	0	.0%

						Count	Subtable Valid N %
Ethnic Group	Beafada	Gender	Female	They make fruits only once per year. African fan palm	True	14	93.3%
					False	1	6.7%
				They make fruits only once per year. Palm Tree	True	1	6.7%
					False	14	93.3%
			Male	They make fruits only once per year. African fan palm	True	15	100.0%
					False	0	.0%
				They make fruits only once per year. Palm Tree	True	0	.0%
					False	15	100.0%
	Balanta	Gender	Female	They make fruits only once per year. African fan palm	True	15	100.0%
					False	0	.0%
				They make fruits only once per year. Palm Tree	True	0	.0%
					False	15	100.0%
			Male	They make fruits only once per year. African fan palm	True	14	93.3%
					False	1	6.7%
				They make fruits only once per year. Palm Tree	True	1	6.7%
					False	14	93.3%

						Count	Subtable Valid N %
Ethnic Group	Beafada	Gender	Female	Many animals use them. African fan palm	True	13	86.7%
					False	2	13.3%
				Many animals use them. Palm Tree	True	13	86.7%
					False	2	13.3%
			Male	Many animals use them. African fan palm	True	15	100.0%
					False	0	.0%
				Many animals use them. Palm Tree	True	15	100.0%
					False	0	.0%
	Balanta	Gender	Female	Many animals use them. African fan palm	True	15	100.0%
					False	0	.0%
				Many animals use them. Palm Tree	True	15	100.0%
					False	0	.0%
			Male	Many animals use them. African fan palm	True	14	93.3%
					False	1	6.7%
				Many animals use them. Palm Tree	True	15	100.0%
					False	0	.0%

						Count	Subtable Valid N %
Ethnic Group	Beafada	Gender	Female	The leaves grow back when we cut them. Palm Tree	True	15	100.0%
					False	0	.0%
				The leaves grow back when we cut them. African fan palm	True	15	100.0%
					False	0	.0%
			Male	The leaves grow back when we cut them. Palm Tree	True	15	100.0%
					False	0	.0%
				The leaves grow back when we cut them. African fan palm	True	15	100.0%
					False	0	.0%
	Balanta	Gender	Female	The leaves grow back when we cut them. Palm Tree	True	15	100.0%
					False	0	.0%
				The leaves grow back when we cut them. African fan palm	True	15	100.0%
					False	0	.0%
			Male	The leaves grow back when we cut them. Palm Tree	True	15	100.0%
					False	0	.0%
				The leaves grow back when we cut them. African fan palm	True	15	100.0%
					False	0	.0%

						Count	Subtable Valid N %
Ethnic Group	Beafada	Gender	Female	They live longer than people. Palm Tree	True	15	100.0%
					False	0	.0%
				They live longer than people. African fan palm	True	15	100.0%
					False	0	.0%
			Male	They live longer than people. Palm Tree	True	15	100.0%
					False	0	.0%
				They live longer than people. African fan palm	True	15	100.0%
					False	0	.0%
	Balanta	Gender	Female	They live longer than people. Palm Tree	True	15	100.0%
					False	0	.0%
				They live longer than people. African fan palm	True	13	86.7%
					False	2	13.3%
			Male	They live longer than people. Palm Tree	True	15	100.0%
					False	0	.0%
				They live longer than people. African fan palm	True	14	93.3%
					False	1	6.7%

These animals live alone. Chimpanzee					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	True	2	3,3	3,3	3,3
	False	58	96,7	96,7	100,0
	Total	60	100,0	100,0	

These animals live alone. Gazelle					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	True	53	88,3	88,3	88,3
	False	7	11,7	11,7	100,0
	Total	60	100,0	100,0	

These animals live alone. Baboon					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	True	1	1,7	1,7	1,7
	False	59	98,3	98,3	100,0
	Total	60	100,0	100,0	

These animals live alone. Cane rat					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	True	5	8,3	8,3	8,3
	False	55	91,7	91,7	100,0
	Total	60	100,0	100,0	

They live in the bush. Chimpanzee					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	True	60	100,0	100,0	100,0

They live in the bush. Gazelle					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	True	59	98,3	98,3	98,3
	False	1	1,7	1,7	100,0
	Total	60	100,0	100,0	

They live in the bush. Baboon					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	True	60	100,0	100,0	100,0

They live in the bush. Cane rat					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	True	59	98,3	98,3	98,3
	False	1	1,7	1,7	100,0
	Total	60	100,0	100,0	

They live as long as people. Chimpanzee					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	True	9	15,0	15,0	15,0
	False	51	85,0	85,0	100,0
	Total	60	100,0	100,0	

They live as long as people. Gazelle					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	True	10	16,7	16,7	16,7
	False	50	83,3	83,3	100,0
	Total	60	100,0	100,0	

They live as long as people. Baboon					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	True	10	16,7	16,7	16,7
	False	50	83,3	83,3	100,0
	Total	60	100,0	100,0	

They live as long as people. Cane rat					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	True	50	83,3	83,3	83,3
	False	10	16,7	16,7	100,0
	Total	60	100,0	100,0	

They have more than one baby at a time. Chimpanzee					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	True	60	100,0	100,0	100,0

They have more than one baby at a time. Gazelle					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	True	1	1,7	1,7	1,7
	False	59	98,3	98,3	100,0
	Total	60	100,0	100,0	

They have more than one baby at a time. Baboon					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	True	8	13,3	13,3	13,3
	False	52	86,7	86,7	100,0
	Total	60	100,0	100,0	

They have more than one baby at a time. Cane rat					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	False	60	100,0	100,0	100,0

They sleep in the trees. Chimpanzee					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	True	57	95,0	95,0	95,0
	False	3	5,0	5,0	100,0
	Total	60	100,0	100,0	

They sleep in the trees. Gazelle					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	False	60	100,0	100,0	100,0

They sleep in the trees. Baboon					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	True	59	98,3	98,3	98,3
	False	1	1,7	1,7	100,0
	Total	60	100,0	100,0	

They sleep in the trees. Cane rat					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	False	60	100,0	100,0	100,0

They eat fruits. Chimpanzee					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	True	47	78,3	78,3	78,3
	False	13	21,7	21,7	100,0
	Total	60	100,0	100,0	

They eat fruits. Gazelle					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	True	31	51,7	51,7	51,7
	False	29	48,3	48,3	100,0
	Total	60	100,0	100,0	

They eat fruits. Baboon					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	True	55	91,7	91,7	91,7
	False	5	8,3	8,3	100,0
	Total	60	100,0	100,0	

They eat fruits. Cane rat					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	True	30	50,0	50,0	50,0
	False	30	50,0	50,0	100,0
	Total	60	100,0	100,0	

They are eaten by leopards. Chimpanzee					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	True	1	1,7	1,7	1,7
	False	59	98,3	98,3	100,0
	Total	60	100,0	100,0	

They are eaten by leopards. Gazelle					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	True	51	85,0	85,0	85,0
	False	9	15,0	15,0	100,0
	Total	60	100,0	100,0	

They are eaten by leopards. Baboon					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	True	5	8,3	8,3	8,3
	False	55	91,7	91,7	100,0
	Total	60	100,0	100,0	

They are eaten by leopards. Cane rat					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	True	41	68,3	68,3	68,3
	False	19	31,7	31,7	100,0
	Total	60	100,0	100,0	

They were planted by the old ones. Palm Tree					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	True	6	10,0	10,0	10,0
	False	54	90,0	90,0	100,0
	Total	60	100,0	100,0	

They were planted by the old ones. African fan palm					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	True	6	10,0	10,0	10,0
	False	54	90,0	90,0	100,0
	Total	60	100,0	100,0	

Fruits are eaten only by people. Palm Tree					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	True	4	6,7	6,7	6,7
	False	56	93,3	93,3	100,0
	Total	60	100,0	100,0	

Fruits are eaten only by people. African fan palm					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	True	7	11,7	11,7	11,7
	False	53	88,3	88,3	100,0
	Total	60	100,0	100,0	

They have many seedlings. Palm Tree					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	True	60	100,0	100,0	100,0

They have many seedlings. African fan palm					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	True	60	100,0	100,0	100,0

They make fruits only once per year. Palm Tree					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	True	2	3,3	3,3	3,3
	False	58	96,7	96,7	100,0
	Total	60	100,0	100,0	

They make fruits only once per year. African fan palm					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	True	58	96,7	96,7	96,7
	False	2	3,3	3,3	100,0
	Total	60	100,0	100,0	

Many animals use them. Palm Tree					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	True	58	96,7	96,7	96,7
	False	2	3,3	3,3	100,0
	Total	60	100,0	100,0	

Many animals use them. African fan palm					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	True	57	95,0	95,0	95,0
	False	3	5,0	5,0	100,0
	Total	60	100,0	100,0	

The leaves grow back when we cut them. Palm Tree					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	True	60	100,0	100,0	100,0

The leaves grow back when we cut them. African fan palm					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	True	60	100,0	100,0	100,0

They live longer than people. Palm Tree					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	True	60	100,0	100,0	100,0

They live longer than people. African fan palm					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	True	57	95,0	95,0	95,0
	False	3	5,0	5,0	100,0
	Total	60	100,0	100,0	

Appendix 9

Wildlife preferences data collection

Of all the animals that exist in this bush tell me: Which ones do you most like to see?

Gender	Ethnic group			Frequency	Percent	Valid Percent	Cumulative Percent
Male	Beafada	Valid	Baboon	3	4,7	4,7	4,7
			Buffalo	1	1,6	1,6	6,3
			Chimpanzee	6	9,4	9,4	15,6
			Duiker	4	6,3	6,3	21,9
			Gazelle	43	67,2	67,2	89,1
			Grey goat	1	1,6	1,6	90,6
			Hornbill	1	1,6	1,6	92,2
			Patas monkey	3	4,7	4,7	96,9
			Roan antelope	1	1,6	1,6	98,4
			Green monkey	1	1,6	1,6	100,0
			Total	64	100,0	100,0	
	Balanta	Valid	Baboon	3	4,6	4,6	4,6
			Buffalo	2	3,1	3,1	7,7
			Bush pig	1	1,5	1,5	9,2
			Butterfly	1	1,5	1,5	10,8
			Chimpanzee	12	18,5	18,5	29,2
			Duiker	1	1,5	1,5	30,8
			Gazelle	29	44,6	44,6	75,4
			Campbell's monkey	2	3,1	3,1	78,5
			Patas monkey	7	10,8	10,8	89,2
			Red colobus	1	1,5	1,5	90,8
			Roan antelope	3	4,6	4,6	95,4
			Spot-nosed monkey	1	1,5	1,5	96,9
			Green monkey	2	3,1	3,1	100,0
			Total	65	100,0	100,0	
Female	Beafada	Valid	Baboon	1	1,5	1,5	1,5
			Buffalo	1	1,5	1,5	3,1
			Chimpanzee	1	1,5	1,5	4,6
			Duiker	6	9,2	9,2	13,8
			Gazelle	50	76,9	76,9	90,8
			Campbell's monkey	2	3,1	3,1	93,8
			Patas monkey	3	4,6	4,6	98,5

			Green monkey	1	1,5	1,5	100,0
			Total	65	100,0	100,0	
	Balanta	Valid	Baboon	1	1,6	1,6	1,6
			Bush pig	6	9,4	9,4	10,9
			Chimpanzee	5	7,8	7,8	18,8
			Duiker	3	4,7	4,7	23,4
			Farfana	4	6,3	6,3	29,7
			Gazelle	20	31,3	31,3	60,9
			Campbell's monkey	5	7,8	7,8	68,8
			Patas monkey	7	10,9	10,9	79,7
			Red colobus	1	1,6	1,6	81,3
			Sooty mangabey	6	9,4	9,4	90,6
			Turtle	1	1,6	1,6	92,2
			Green monkey	5	7,8	7,8	100,0
			Total	64	100,0	100,0	

Of all the animals that exist in this bush tell me: Which ones do you less like to see?

Gender	Ethnic group			Frequency	Percent	Valid Percent	Cumulative Percent
Male	Beafada	Valid	Baboon	4	6,3	6,3	6,3
			Buffalo	1	1,6	1,6	7,8
			Bush pig	9	14,1	14,1	21,9
			Chimpanzee	12	18,8	18,8	40,6
			Hyena	17	26,6	26,6	67,2
			Patas monkey	6	9,4	9,4	76,6
			Snake	15	23,4	23,4	100,0
			Total	64	100,0	100,0	
	Balanta	Valid	Baboon	3	4,6	4,6	4,6
			Buffalo	1	1,5	1,5	6,2
			Bush pig	1	1,5	1,5	7,7
			Chimpanzee	6	9,2	9,2	16,9
			Cane rat	2	3,1	3,1	20,0
			Hyena	24	36,9	36,9	56,9
			Pangolin	1	1,5	1,5	58,5
			Patas monkey	4	6,2	6,2	64,6
			Snake	21	32,3	32,3	96,9

			Sooty mangabey	1	1,5	1,5	98,5
			Turtle	1	1,5	1,5	100,0
			Total	65	100,0	100,0	
Female	Beafada	Valid	Bush pig	11	16,9	16,9	16,9
			Chimpanzee	14	21,5	21,5	38,5
			Cane rat	1	1,5	1,5	40,0
			Hyena	12	18,5	18,5	58,5
			Patas monkey	10	15,4	15,4	73,8
			Porcupine	1	1,5	1,5	75,4
			Snake	13	20,0	20,0	95,4
			Green monkey	3	4,6	4,6	100,0
			Total	65	100,0	100,0	
	Balanta	Valid	Baboon	3	4,7	4,7	4,7
			Bush pig	3	4,7	4,7	9,4
			Chimpanzee	20	31,3	31,3	40,6
			Crocodile	1	1,6	1,6	42,2
			Cane rat	1	1,6	1,6	43,8
			Campbell's monkey	2	3,1	3,1	46,9
			Hyena	12	18,8	18,8	65,6
			Patas monkey	3	4,7	4,7	70,3
			Porcupine	1	1,6	1,6	71,9
			Sancho fula	1	1,6	1,6	73,4
			Snake	16	25,0	25,0	98,4
			Green monkey	1	1,6	1,6	100,0
			Total	64	100,0	100,0	